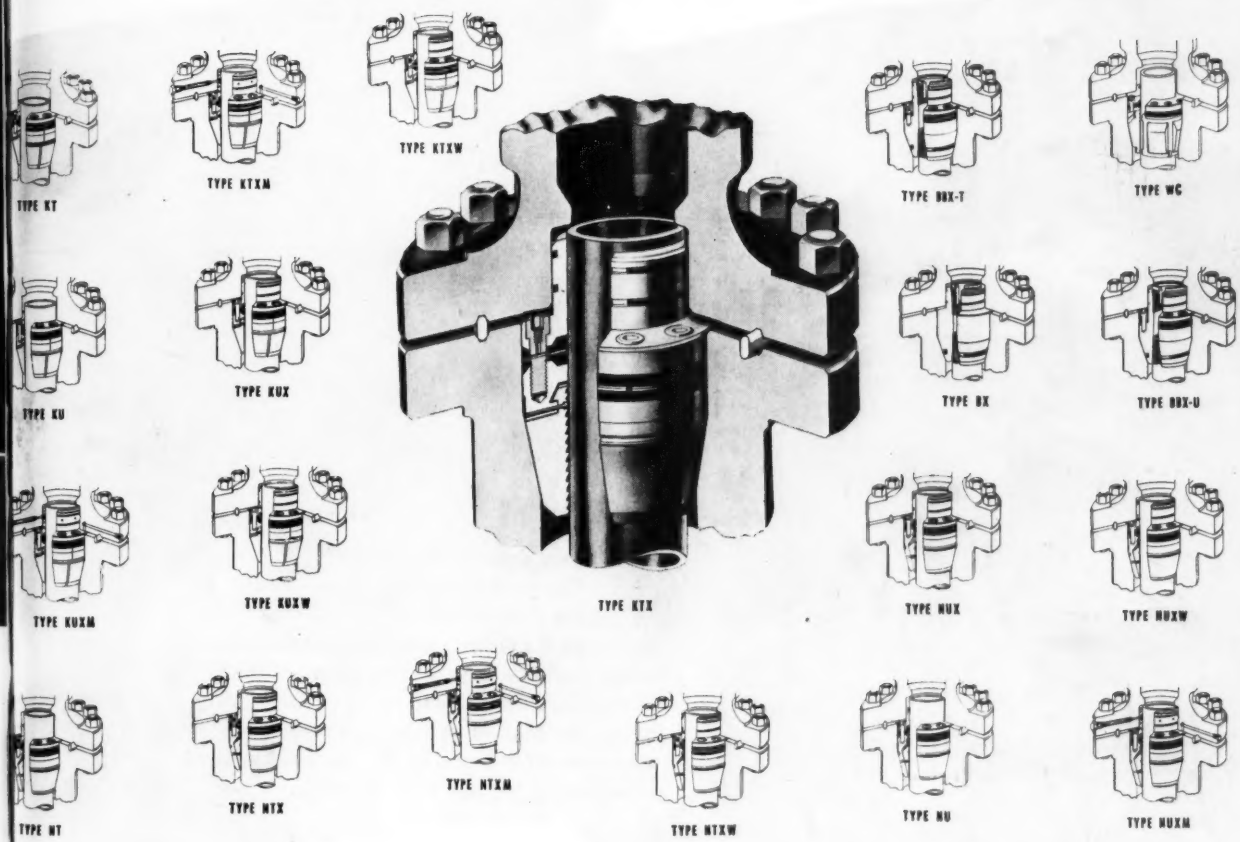
APR 1 1949

the OIL AND GAS JOURNAL

The NEW CAMERONHEAD

GIVES YOU 20 INTERCHANGEABLE TYPES OF HANGERS AND SEALS



Forged Steel

FROM THE INDUSTRY'S LARGEST, MOST MODERN FORGE SHOPS —

CAMERON IRON WORKS, INC.

P. O. BOX 1212 HOUSTON, TEXAS

EXPORT: 74 TRINITY PLACE, NEW YORK

Now, regardless of casing program or well conditions, you may start your well with a CAMERONHEAD and complete it with any of the twenty available hangers and seals best suited for the operation. While the Type KTX, illustrated above, provides slip suspension and a pre-tested resilient seal—which is adequate for most wells—other types of hangers provide multiple resilient and welded seals with or without provision for testing, repackable and automatic seals, and boll-weevil suspension.
Write for complete details.

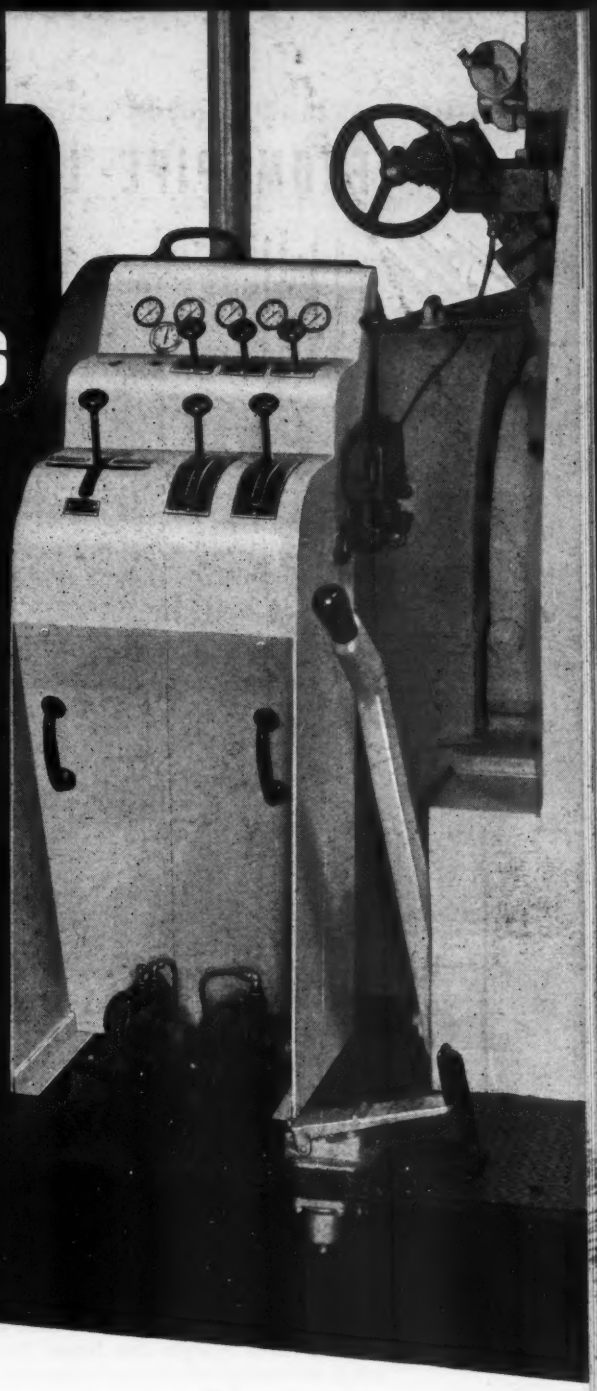
HOW DEEP
IN
THE
HEART
OF
TEXAS?
HOWCO MEASURING DEVICES
How deep in the heart of
any state has the bit penetrated?
For more than 20 years oil men have
looked to the Howco Measuring Device for the
answer. Accurate beyond any other known
method . . . available in types to meet every
condition on land or at sea . . . accepted
wherever oil is found as the standard method
of measuring the depth of wells.
HALLIBURTON OIL WELL CEMENTING CO. DUNCAN, OKLAHOMA

XUM

No more wrestling with clumsy levers

A touch of the hand and it's done

THAT'S BETHLEHEM FINGER-TIP CONTROL



No longer need drillers push, tug, haul and shove, grunt and groan. With the advent of Bethlehem Finger-Tip Control, the ancient struggle between man and levers became a thing of the past.

These new feather-touch air controls—all within inches of the driller—now feature *every* Bethlehem drilling rig. For more hole—*faster*—get Finger-Tip Control!

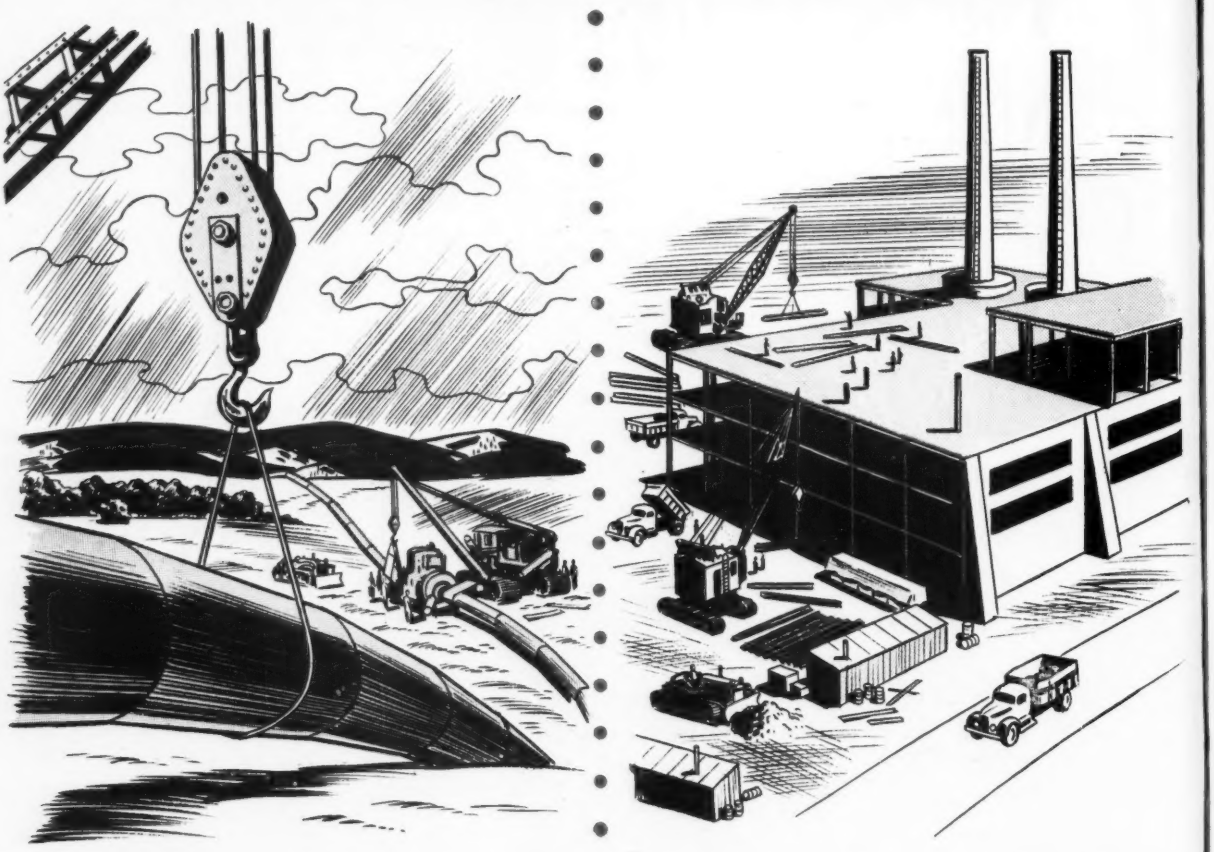
BETHLEHEM SUPPLY COMPANY

General Offices: 21 E. Second Street, Tulsa, Okla.

Subsidiary of Bethlehem Steel Corporation

BETHLEHEM STEEL

FROM PIPE LINES TO PAPER PLANTS



BROWN & ROOT is geared to do the job BEST!

Whether your project calls for a pipe line or paper plant — refinery or chemical plant, Brown & Root is prepared to meet your exacting demands efficiently. Thirty-five years' experience in the industrial engineering and construction field assures clients the finest in planning, process analysis, architectural, and engineering skill.

Brown & Root's staff of specialists makes possible a completely integrated service including expert advice on plant location, thorough planning and supervision of construction, and delivery of ready-to-operate plant, all under one contract—one responsibility.

If your plans call for new construction or expansion, at your invitation a Brown & Root expert will gladly make a complete survey for you. Why not call or write today? There is, of course, no obligation involved.

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Associate Companies:— BROWN ENGINEERING CORP. • BROWN & ROOT MARINE OPERATORS INC.

You get MORE CAPACITY with a FANMIX BURNER

Increase Boiler Ratings On Present Or Planned Equipment

In all types of Coppus-Dennis FANMIX Burners — straight gas or combination gas-oil — we utilize the energy of the fuel under pressure to drive the burner fan and deliver air in the proper proportion to the fuel flow. This exclusive "pinwheel action" *mechanically* mixes fuel and air in exactly the right proportions for truly radiant, non-luminous heat.

The result is uniform temperature everywhere in the combustion chamber — no drifting "hot spots" — and complete combustion under all conditions. That's why you can release more heat into your present furnace — why in new installations you get more heat into smaller furnace space.

FANMIX Saves On Both Old and New Installations

FANMIX can easily be operated with your present furnace and stack, requiring only minor changes in other equipment. Or if you're planning on new boilers, remember that FANMIX relieves the furnace from the burden of mixing, creates its own forced draft and takes smaller pipe sizes. Which means you can plan on reduced combustion space, less stack, no forced draft equipment and lower installation costs all around.

Get the Whole Story

Coppus engineers FANMIX Burners to meet individual requirements, providing complete control over heat pattern and combustion . . . Learn more about how "pinwheel action" can step up *your* boiler performance to peak efficiency and economy — as it is doing throughout industry. Send for Bulletin 410-6. Coppus Engineering Corp., Worcester 2, Mass. Sales Offices in THOMAS' REGISTER. Other Coppus "Blue Ribbon" Products in BEST'S SAFETY DIRECTORY, CHEMICAL ENGINEERING CATALOG, REFINERY CATALOG, and MINING CATALOGS.

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Offers you a mud weighting material that is of a consistently high specific gravity (Average 4.30), which is a fine ground ball mill product.

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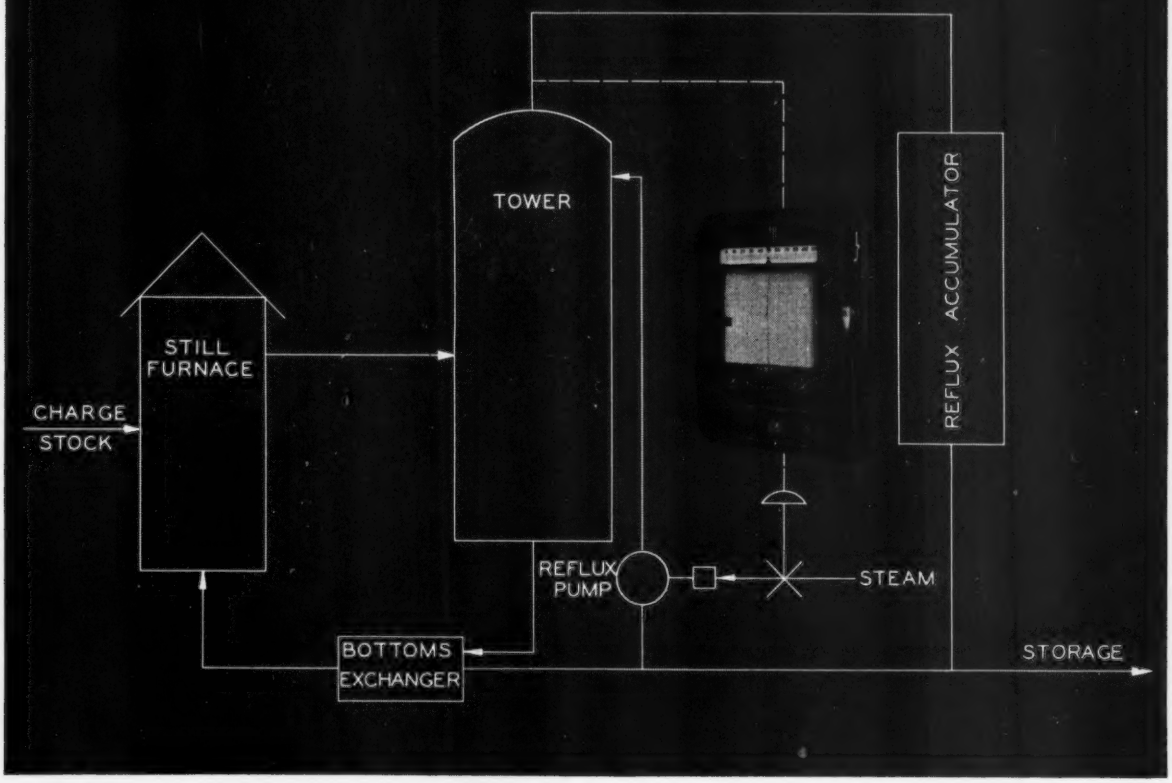
THIS TOWER OFTEN CYCLED
Until Speedomax Complete Control Tied It Down



A certain refinery was plagued by occasional cycling in a group of seven towers used for gasoline production. Just a few minutes of off-temperature operation, on only one of the seven units, frequently cost the profit margin between a tankful of premium and one of regular gasoline. Company engineers simply accepted cycling as part of this particular set-up because no available temperature controller could handle this job.

When the new Speedomax *complete* Pneumatic Control was announced, however, the engineering department investigated. We explained our new product's features; especially its truly-stabilized rate action. The refinery men saw that this type of action ought to stop cycling. We told them it would, and had already done so in other plants. So, they desided to try it for themselves.

One of the first tests of the new control came when the operator was told to step the tower up from 440F to 455F. The operator, playing safe, started by shifting the control setter just five degrees. The temperature rose promptly; settled at the new figure. Another step—and a third—with the same results—put the unit at 455F without loss of a minute's time and with no cycling whatsoever. The premium grade was attained for all production.

Naturally, more Speedomax complete Pneumatic Controls have gone to that plant. They are showing benefits on other processes—benefits due to such merits as stable control point and bumpless transfer from manual to automatic regulation. Today the plant uses over thirty of these equipments as part of their still-expanding instrumentation program.

Complete details of Speedomax Pneumatic Control are in Catalog ND4B. Write for it today. Or, if you prefer, an L&N Field Engineer will be glad to call on request.

Leeds & Northrup Company, 4959 Stenton Avenue, Philadelphia 44, Pa.

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Jrl Ad N-33-702(10)

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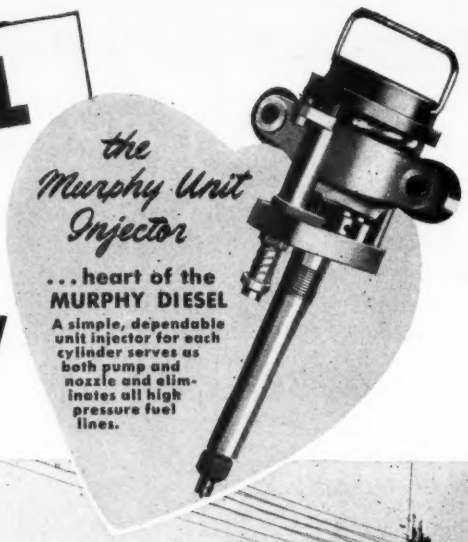
XUM

MURPHY DIESEL POWER

Rugged dependability plus operating economy



the Murphy Unit Injector

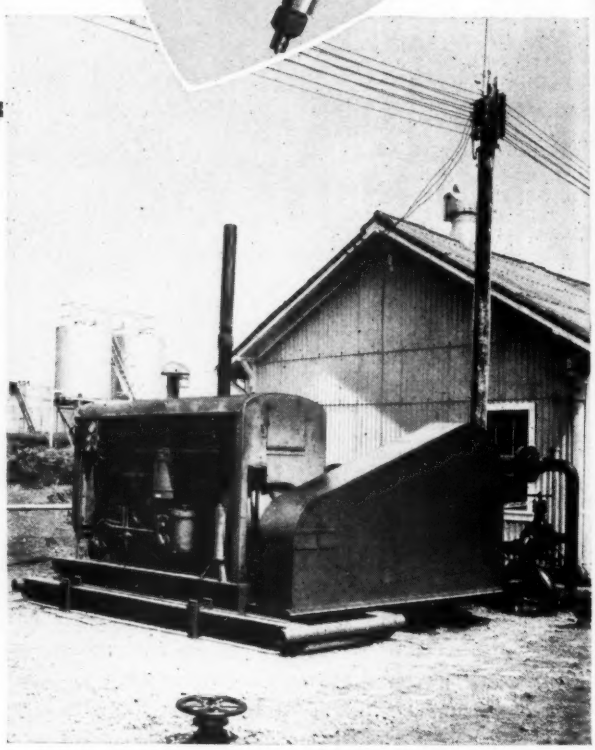
. . . heart of the MURPHY DIESEL

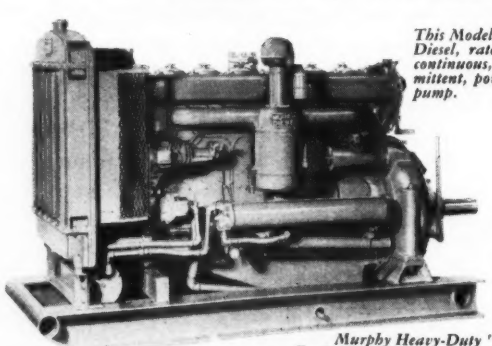
A simple, dependable unit injector for each cylinder serves as both pump and nozzle and eliminates all high pressure fuel lines.

Because it is a "true" Diesel—solid fuel injected directly into a plain open combustion chamber—the Murphy Diesel offers that highly desirable combination . . . dependable heavy-duty power *plus* operating economy. The "true" diesel operating principle in combination with such outstanding features as unit fuel injection, four valves per cylinder, dual overhead camshafts, flywheel-end cam drive and the hydraulic servo-type governor means that the Murphy Diesel is able to deliver more uninterrupted power day-in and day-out at a lower cost per horsepower.

Get full details today from your Murphy Diesel Dealer. Ask him for a copy of the booklet *"7 Questions to Ask a Diesel Engine Salesman"* or write to:

MURPHY DIESEL COMPANY
5305 West Burnham St., Milwaukee 14, Wisconsin





This Model ME-66 Murphy Diesel, rated at 150 H.P. continuous, 180 H.P. intermittent, powers a pipe line pump.

Murphy Heavy-Duty "True" Diesel Engines and Power Units 90 to 215 H.P.; Generator Sets, 60 to 115 K.W., A.C. or D.C.

MURPHY DIESEL

LOWEST ULTIMATE POWER COST

FACTORY BRANCH—SALES, PARTS and SERVICE
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Complete selection in refinery piping ... on one order to CRANE

It's good to remember that Crane can supply all refinery piping needs on one order. A good example is this **Suction and Discharge Piping**—all valves, fittings, pipe and accessories are available from Crane. And no one can give you faster service than Crane, through a network of local Branches co-operating to serve you—and having direct access to large factory stocks.

So why not rely, as so many oil men do, on this **Single Source of Supply** to simplify all piping procedures? **Complete Responsibility** on Crane for materials gives you better installations, avoids needless delays. **High Quality** in every item from the broad Crane line helps to assure dependable performance throughout your piping systems.

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RESPONSIBILITY
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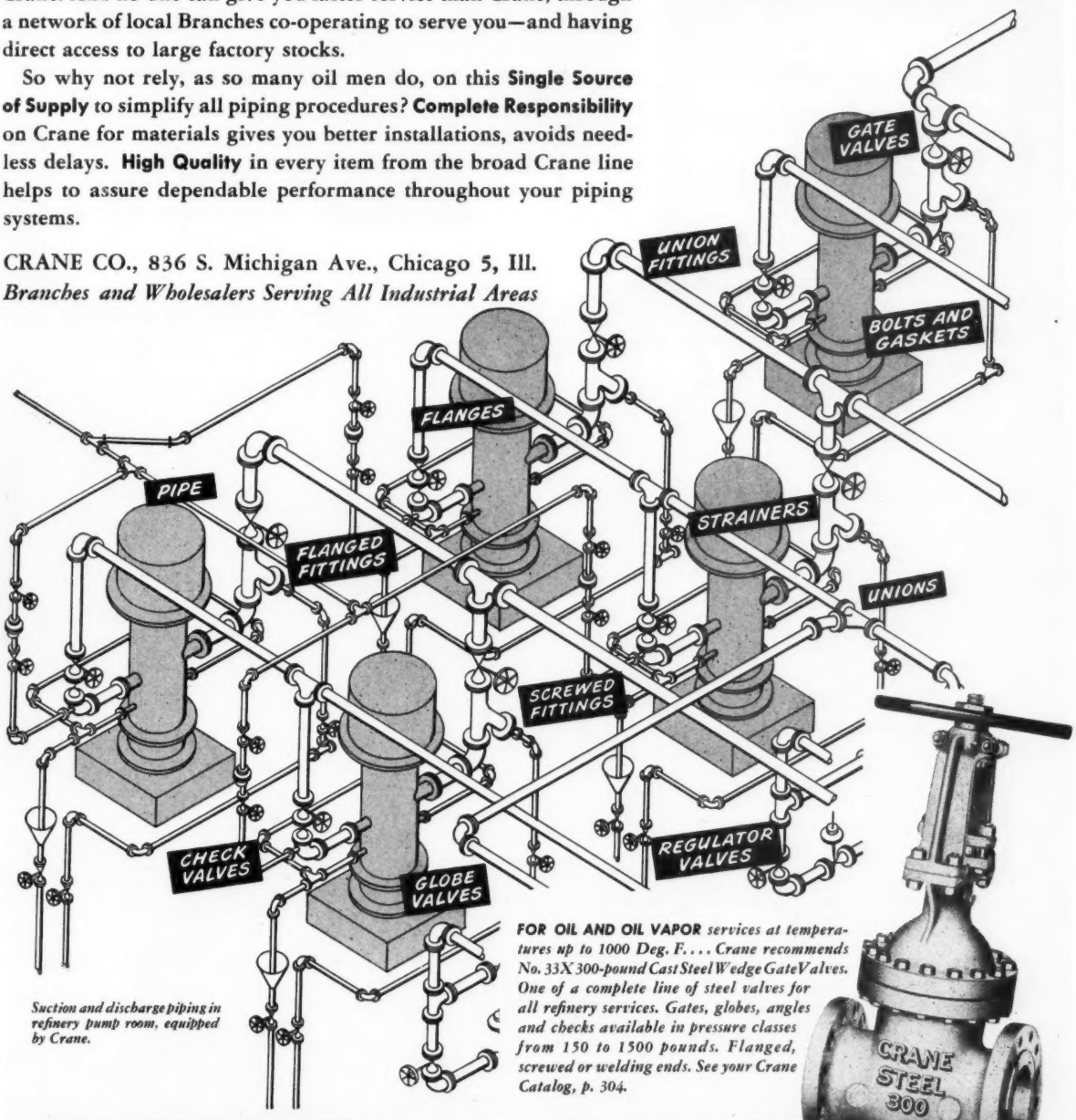

Suction and discharge piping in refinery pump room, equipped by Crane.

FOR OIL AND OIL VAPOR *services at temperatures up to 1000 Deg. F.... Crane recommends No. 33X 300-pound Cast Steel Wedge Gate Valves. One of a complete line of steel valves for all refinery services. Gates, globes, angles and checks available in pressure classes from 150 to 1500 pounds. Flanged, screwed or welding ends. See your Crane Catalog, p. 304.*

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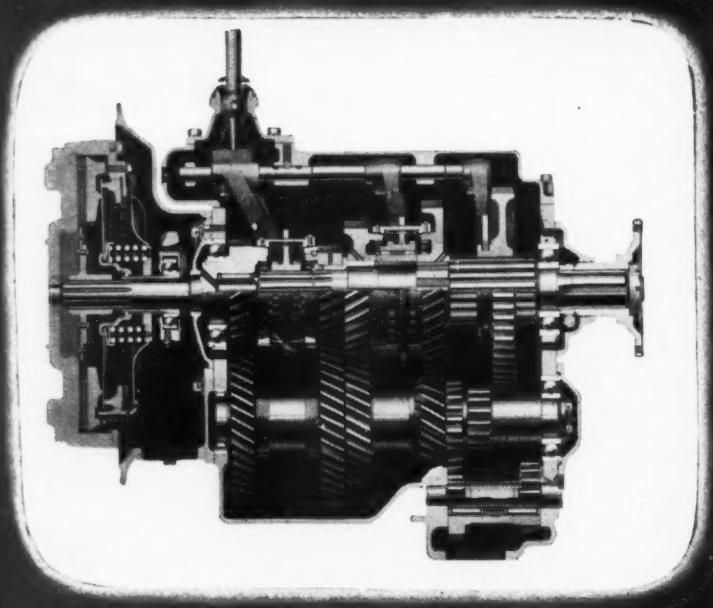
FOR EVERY PIPING SYSTEM

The Purpose of the Spicer Synchronized Transmission

The Spicer Synchronized Transmission is a perfected gear mechanism that works hand in hand with the human ingenuity of the truck driver. Together, they assure an easier job for both: each making the other more efficient, assuring more productive horsepower put into the wheels and more ton-miles handled each day.



The Advantages of the Spicer Synchronized Transmission

Faster Shifts

No Missed Shifts

Fast Getaway

Less Vehicle Slowdown when Shifting

Down Shifts Made Without Slowdown for Double-Clutching

No Lugging of Engine

Shifting Lever Travels Same Distance Every Shift

Savings in Fuel

Lower Vehicle Upkeep

Spicer engineers will help your vehicles move more tons at less cost per mile, by adapting the Spicer Synchronized Transmission to your individual needs.

SPICER MANUFACTURING
Division of Dana Corporation
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45 YEARS OF Spicer SERVICE

TRANSMISSIONS • PASSENGER CAR AXLES
CLUTCHES • PARISH FRAMES • STAMPINGS
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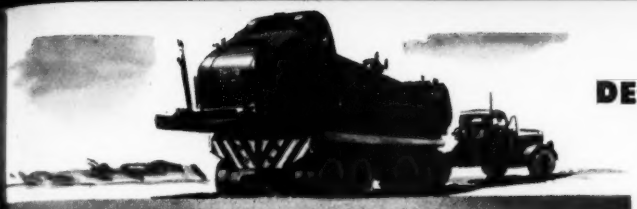
SPICER "BROWN-LIPE" GEAR BOXES
RAILWAY GENERATOR DRIVES

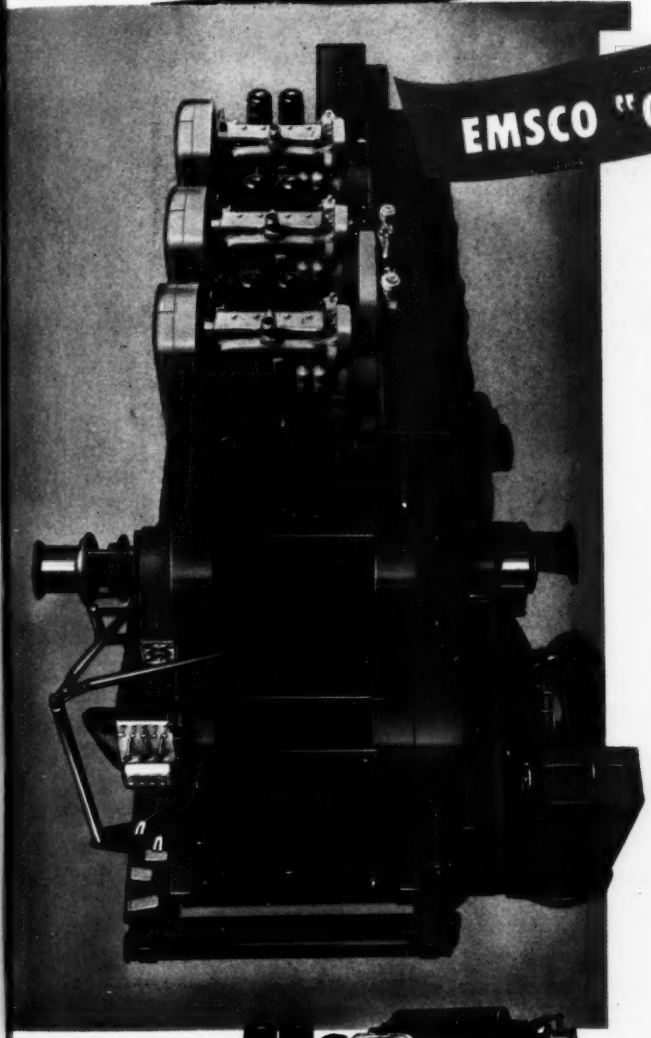


DESIGNED FOR PORTABILITY

ENGINEERED FOR EFFICIENCY

BUILT FOR ECONOMY

EMSCO "GA" SERIES DRILLING RIGS



Two or three engine compounding transmission provides maximum flexibility.

Fawick Airflex clutches on engines facilitate rigging-up and dismantling.

Compounding transmission and drawworks mounted on common skid base.

Drawworks has built-in selective speed transmission providing six hoisting speeds, three rotary speeds, one reverse to the drum and one reverse to the rotary.

Catshaft designed to accommodate standard makes of catheads. Rig may be equipped with, or without sand reel.

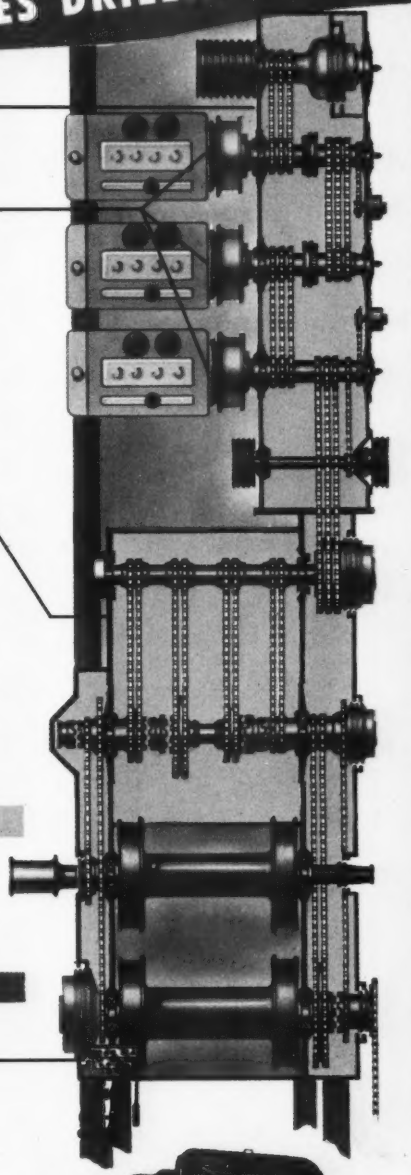
All drives totally enclosed and flood-lubricated from built-in oil pumps. No grease fittings used except on brake linkage.

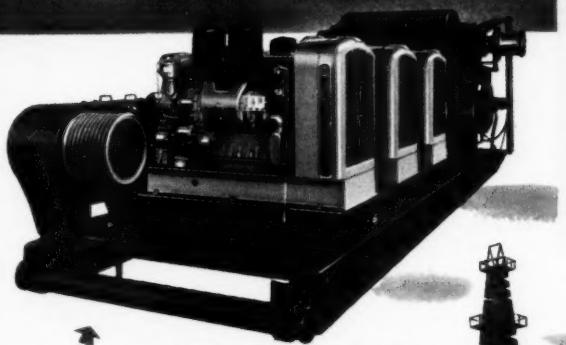
OIL LUBRICATED AREAS

Direct air-operated friction clutches provide smooth, high-speed operation.

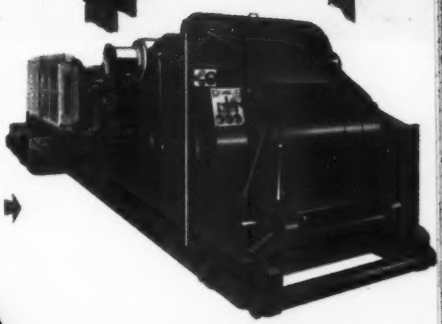
AIR-OPERATED CLUTCHES

All controls conveniently located at driller's position.





Rear View of Emsco GA-350 Drilling Rig. With certain makes of engines on a 3-engine, 350 hp. rig, the engines are mounted on a common skid base and the complete rig meets eight foot road clearance requirements. Push button air controls are provided for operation of the jaw clutches in the selective speed transmission.



Front View of Emsco GA-500 Drilling Rig. A 500 hp. rig designed and engineered for faster, safer and more economical drilling of medium depth wells. Optional equipment for both rigs includes sand reel, rope rollers, rat hole digger, wash down pump, hydromatic or dynamatic brake, Thyrite generators, guards, etc.

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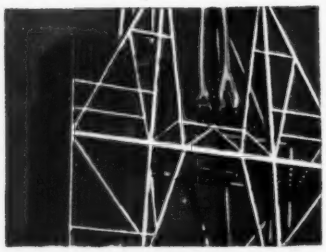
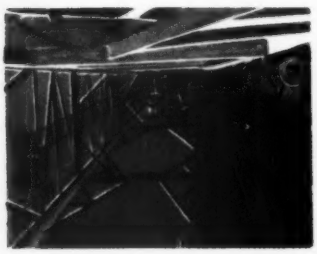
Sturdy Travelers...

EMSCO BULGE TYPE PORTABLE MAST

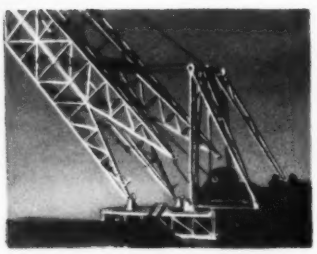
Easy to erect ... safe to operate ... quick to move! These are the operating characteristics of Emsco Bulge Type Portable Masts. Here are completely portable units designed and engineered for drilling to 18,000 feet. They may be quickly dismantled and moved to another location, and erected on it with a minimum of time and expense. Ask your nearest representative for complete information.



Exclusive *bulge* feature permits racking pipe inside base of mast. Casing may be run with drill pipe in bulge. Split board working platform speeds drilling operations.



Lacing of all four faces of mast eliminates need for interior bracing; gives unobstructed visibility to both driller and derrick man; minimizes vibration and weaving.



Mast easily and safely erected by drawworks. Patented safety features insure positive control. Mast is readily dismantled into road width packages, or moved intact.

A SIZE AND TYPE TO MEET EVERY DRILLING REQUIREMENT

12PA—94' welded and painted
12PE—94' bolted and galvanized

17PA—129' welded and painted
17PE—129' bolted and galvanized

17PS—136' welded and painted
17PSE—136' bolted and galvanized

18P—136' welded and painted Available with 1 or 2 bulges. Load rating 800,000 lbs.

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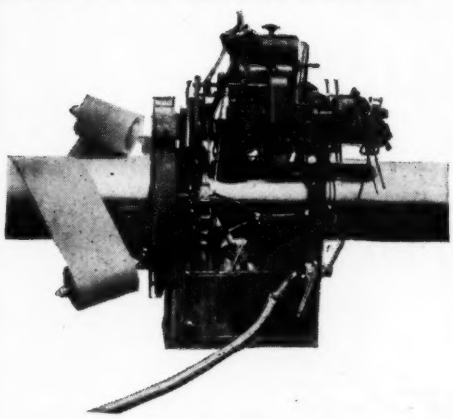
Covers Every Pipe-coating Need

Materials and Application Procedure for:

1. Water Industries
2. Natural Gas, Crude Oils and Products Transmission
3. Professional Application in Plants and Yards
4. Distribution Systems
5. Reconditioning Operations
6. Gathering Systems
7. Recycling Operations

Materials and Application Procedure for NATURAL GAS, CRUDE OILS AND PRODUCTS TRANSMISSION



Barrett-protected oil and gas pipe is wrapped in asbestos felt to provide a shield for the enamel coating.

Because of the variable weather conditions under which enamel is applied to pipe, it is necessary to have a *weatherized* primer.

Most primers are designed to dry under normal conditions (50% humidity at 70°F) during 9 months of the year, but Barrett also makes special primers for use in very cold and very hot application weather.

These primers form lasting bonds with all Barrett* Enamels. Thus the line engineer is offered a wide range of primer-enamel combinations to suit his particular construction conditions.

The application of hot enamel over the primer *re-softens* the primer, and causes it to fuse with both the metal and the enamel for a perfect bond.

The initial and sustained dielectric values of Barrett enamels remain unchanged under all normal line currents. Since these values do not break down under electric currents put on the pipe, the economy of cathodic protection is assured.

The Barrett organization will be glad to confer with you on any of your pipe coating problems.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

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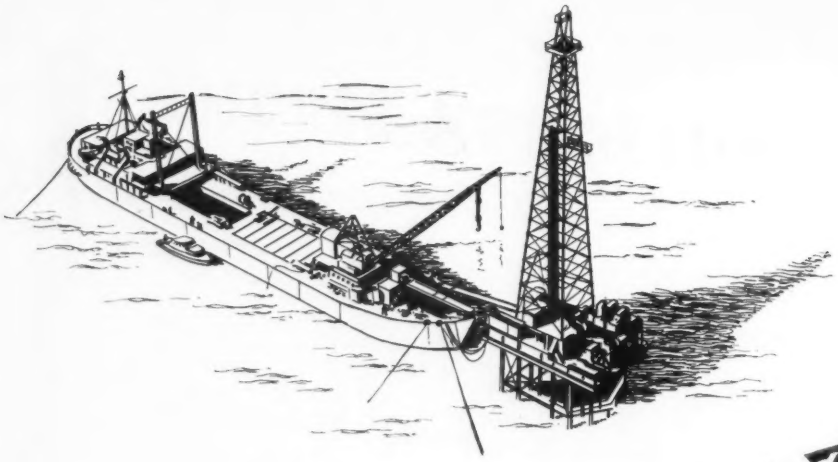
Barrett*



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PIONEER IN THE DEVELOPMENT OF MARINE DRILLING EQUIPMENT –

Specializing in Submersible Drill Barges and Offshore Drilling Tenders

Levingston

SHIPBUILDING COMPANY

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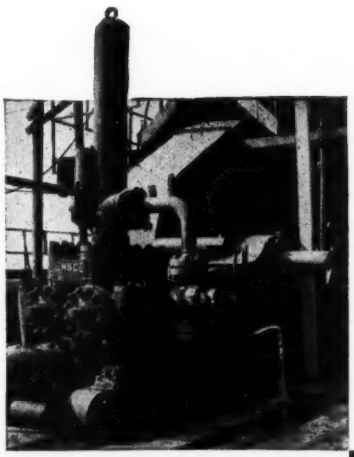
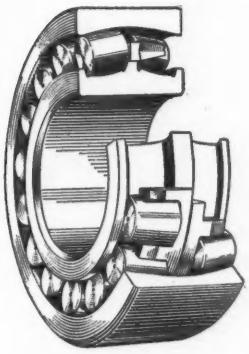
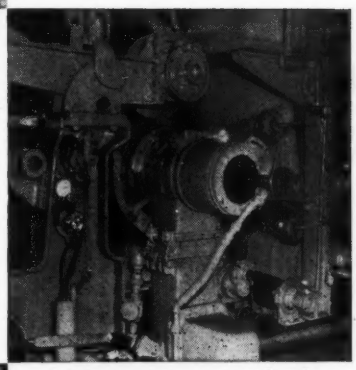
Torrington Spherical Roller Bearings

roll back costs



Emsco mounts slush pump main shaft on Torrington Spherical Roller Bearings for dependable day-in, day-out performance on the heaviest drilling schedules.





Beloit gets accurate initial and running alignment of suction press rolls with Spherical Roller Bearings. Maintenance costs go down because bearings need less attention.

Robins Car Shakeout eccentric shafts are mounted on Torrington Spherical Roller Bearings. Power requirements are negligible, thanks to the smooth operation of these self-aligning bearings.

If you measure costs in man-hours, power and production, Torrington Spherical Bearings can roll them back.

Where these self-aligning bearings operate, maintenance crews spend no time making adjustments. Proper rolling alignment is automatically maintained. Even under deflection and misalignment, the bearings run smoothly, so power input is less and service life longer. Replacements are few and far between, downtime reduced, production sustained.

Your heavy-duty machinery, too, can cost less to run and maintain with the advantages of Spherical Roller Bearing operation. Our engineers will bring to your specific friction problems specialized experience gained in every industry. Write us today.

THE TORRINGTON COMPANY
South Bend 21, Ind. • Torrington, Conn.
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TORRINGTON SPHERICAL ROLLER **BEARINGS**

Spherical Roller • Tapered Roller • Straight Roller • Needle • Ball • Needle Rollers

if a core could speak...

it could tell you *no more* about its immediate and future productive characteristics *than can be measured and reported by Core Lab.*

Operators in increasing numbers are realizing the capital significance of obtaining reliable basic core analysis data, and, with Core Lab's experienced interpretations, they are accurately determining productive possibilities, fluid contacts, effective pay thickness, and the economic feasibility of testing and completing. These same basic data are then applied further for the appraisal of maximum ultimate recovery from the formation. No reservoir can be properly engineered without this fundamental knowledge. And only from a core can this completely comprehensive information be obtained.

So, let Core Lab speak with experience for *your* core.

CORE LABORATORIES, INC. • DALLAS, TEXAS

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"If it's worth coring, it's worth analyzing."

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PETROLEUM RESERVOIR ENGINEERING

XUM

HERE ARE THE EXTRAS
you get when you buy an engine from
STEWART & STEVENSON SERVICES

Guaranteed Performance
Service Certificates
Centralized Responsibility
Stewart & Stevenson One-Trip Service
Factory-Trained Engine Experts
Flat Rate Zone Trip Charges

STEWART & STEVENSON SERVICES

STEWART & STEVENSON FLAT RATE ZONE TRIP CHARGES

In addition to offering the quickest engine repair service in Texas, Stewart & Stevenson has established a flat rate zone trip charge to make this quick service also the most economical.

At the center of each circle on this map is a Stewart & Stevenson Service point. This network assures service satisfaction at low flat rate charges when you purchase your engine from Stewart & Stevenson.

Stewart & Stevenson zone maps and flat rate schedule are available for the asking.

The flat rate zone trip charge is just one of the many extras you get when you purchase a GM Diesel, Continental Red Seal or Chicago Pneumatic Diesel from Stewart & Stevenson. Ask about the others.

STEWART & STEVENSON SERVICES, Inc.

HOUSTON	DALLAS	CORPUS CHRISTI	McALLEN	WICHITA FALLS	GREGGTON	LUBBOCK
4516 Harrisburg Blvd.	4801 Lemmon Ave.	643 N. Port Ave.	19 East Highway	P. O. Box 1415	P. O. Box 546	1624 4th Ave.
Phone W. 6-9691	Phone L. 6-6649	Phone 8252	Phone 1760	Phone 2-3319	Phone 2007	Phone 2-7538

DEALERS:
Sabine Propeller & Marine Service, Port Arthur, Texas
Balch Truck & Implement Company, San Angelo, Texas
Phillips-Torgerson Company, San Antonio, Texas
Standard Engine Company, Longview, Texas

SALES REPRESENTATIVES

BEAUMONT	LONGVIEW	LIVINGSTON	LAREDO
Phone 2-9619	Phone 3292-R	Phone 429-G	Phone 1513

DISTRIBUTORS OF: General Motors Diesel Engines 30 to 800 horsepower • Chicago Pneumatic Gas and Diesel Engines 300 to 1650 horsepower • Continental Red Seal Gas and Diesel Engines 10 to 200 horsepower • Adel Hydraulic Controls Gardner-Denver Pumps

FABRICATORS OF: Electric Power Units • Electrical Control Equipment • Truck Bodies Portable Pumping Units, Etc.

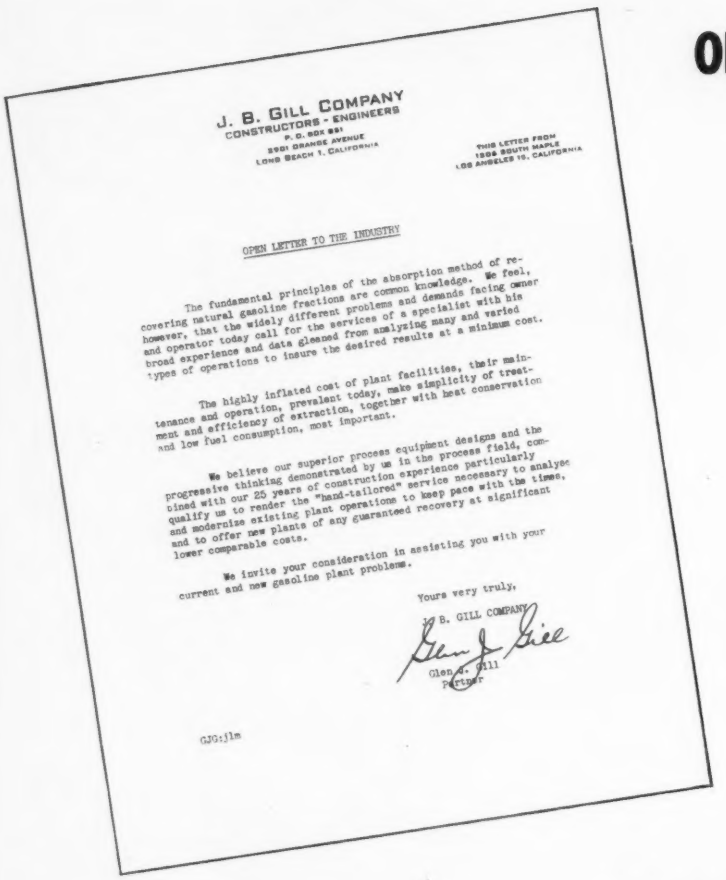
*GM Diesels not available at this branch

PARTS • SERVICE
ANYTIME • ANYWHERE

GM GENERAL MOTORS DIESEL POWER

CONTINENTAL MOTORS AMERICA'S STANDARD

THE NATION'S LARGEST DISTRIBUTORS OF GM DIESEL ENGINES



J. B. GILL COMPANY
CONSTRUCTORS - ENGINEERS
P. O. BOX 851
2901 ORANGE AVENUE
LONG BEACH 1, CALIFORNIA

THIS LETTER FROM
1808 SOUTH MAPLE
LOS ANGELES 15, CALIFORNIA

OPEN LETTER TO THE INDUSTRY

The fundamental principles of the absorption method of recovering natural gasoline fractions are common knowledge. We feel, however, that the widely different problems and demands facing owner and operator today call for the services of a specialist with his broad experience and data gleaned from analyzing many and varied types of operations to insure the desired results at a minimum cost.

The highly inflated cost of plant facilities, their maintenance and operation, prevalent today, make simplicity of treatment and efficiency of extraction, together with heat conservation and low fuel consumption, most important.

We believe our superior process equipment designs and the progressive thinking demonstrated by us in the process field, combined with our 25 years of construction experience particularly qualify us to render the "hand-tailored" service necessary to analyze and modernize existing plant operations to keep pace with the times, and to offer new plants of any guaranteed recovery at significant lower comparable costs.

We invite your consideration in assisting you with your current and new gasoline plant problems.

Yours very truly,

J. B. GILL COMPANY

Glen J. Gill
Partner

GJG:jlm

ON YOUR NEXT PLANT

Slash Initial Cost *as much as* 25%

with a J. B. GILL COMPANY *Installation*

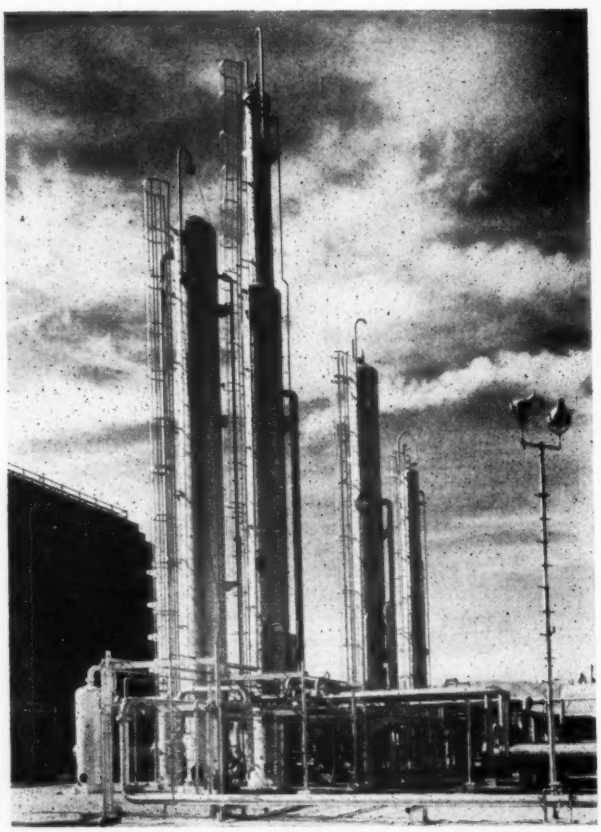
Photo at right pictures an absorption plant, built by J. B. Gill Company in California. Note Key Operating Factors listed below. Reduce your first cost on that *next* plant. Phone—Wire—J. B. Gill Company, 2901 Orange Avenue, Long Beach 1, California.

KEY OPERATING FACTORS

R.H.E. Absorption Cycle

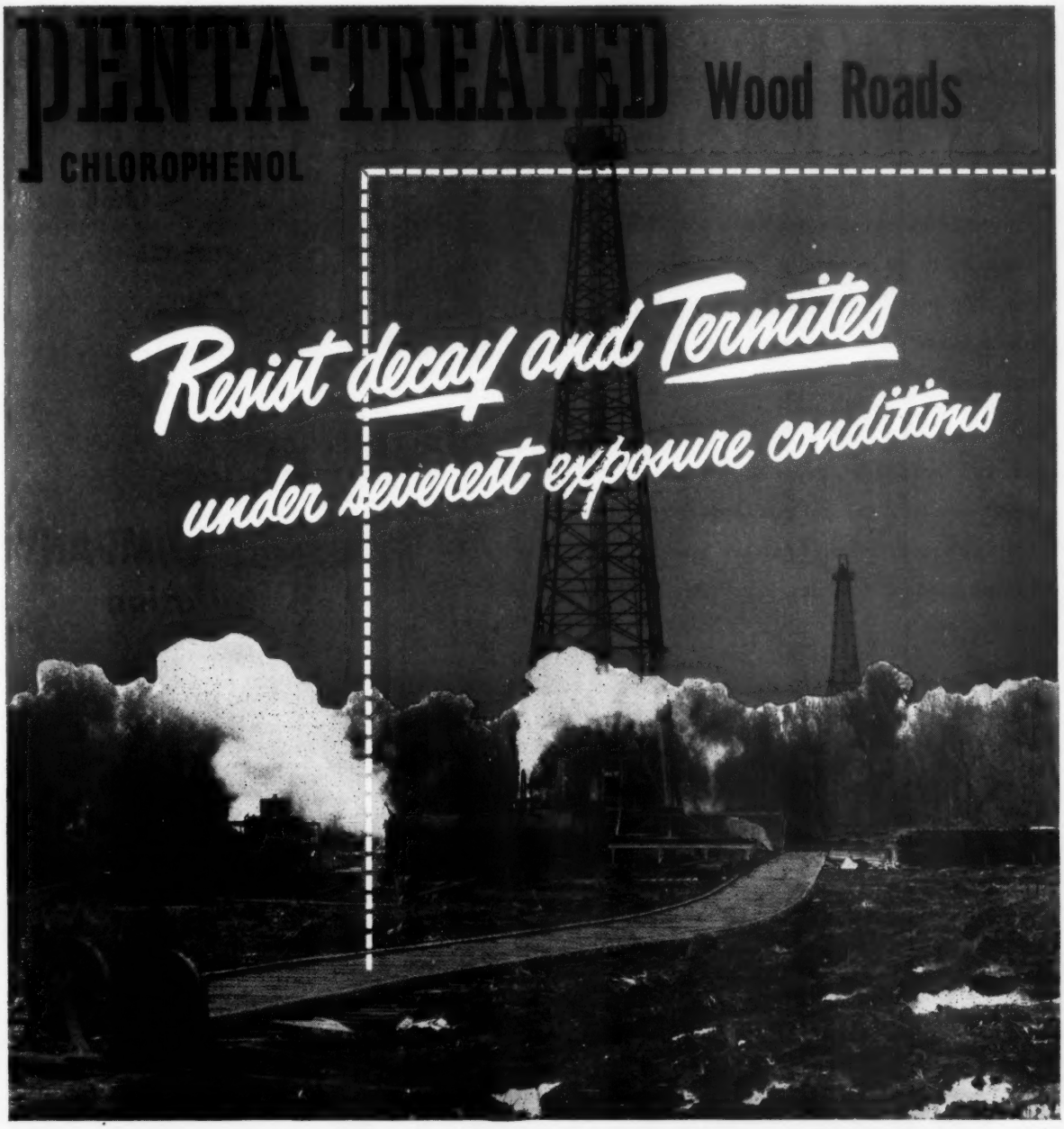
(Patents Pending)

RICH GAS LOAD		HIGH	NORMAL
ABSORBER OPERATION			
Operating Pressure	P.S.I.G.	405	400
Rich Gas Treated	M.C.F./D.	30,000	17,500
Propane in Rich Gas	Gal./M.C.F.	0.817	0.817
Iso-Butane Plus in Rich Gas	Gal./M.C.F.	0.835	0.835
Lean Oil @ 180 Mol. Wt. Gal. L.O./M.C.F. R.G.		8.50	16.7
Rich Oil From Absorber	°F.	80	90
Propane Absorbed	Pct.	30.7	55
RICH-OIL RECTIFIER			
Propane Retention	Pct.	91.0	90
C_5 Content of Propane Cut	Pct.	0.42	0.50
Lean Oil to Coolers	°F.	124	120
RICH-OIL STRIPPER			
Still Pressure	P.S.I.G.	115	115
Stripping Steam Rate	Lbs./Gal. L.O.	0.12	0.10
Net Heat Load (inc. 10% Air Loss)	M.B.T.U./H.	6,200	4,500
Total Liquid Product	Gal./Day	35,750	24,000



PENTA-TREATED Wood Roads

CHLOROPHENOL



PENTAchlorophenol is a *tested* wood preservative. In Louisiana, "PENTA"-treated posts were placed in swamp-like ground and *after twelve years' exposure* were removed in excellent condition. Untreated posts placed beside them failed within two and three years.

"PENTA" is a *clean* preservative . . . protects wood against decay and termites . . . gives wood greater salvage value. "PENTA"-protected lumber lasts years longer than untreated wood!

Reduce maintenance costs and give your wood roads, sheds and other structures added durability—ask for "PENTA"-protected lumber. For more information about PENTAchlorophenol write Dow, Dept. PE 49.

THE DOW CHEMICAL COMPANY · MIDLAND, MICHIGAN

DOW

penta-
chlorophenol

PARKERSBURG PUMPERS
Pay . . . and pay . . . and pay!

First cost is the last cost, and that's why Parkersburg Pumpers pay off in savings on maintenance costs, year after year. Quality-built throughout they have proved the industry's most dependable pumpers for trouble-free service.

Crank and beam balance permits accurate balance of load. Herringbone gears assure greatest power out-put with least amount of friction. Precision bearings throughout mean smoother operation. Floor clearing models minimize foundation costs. Your choice of any type engine or electric motor power unit . . . chain or gear drive.

Consult the Parkersburg Representative nearest you when you have a pumping problem to solve. There's a Parkersburg Pumper ready for your job."

4905

THE PARKERSBURG RIG & REEL CO.

• PARKERSBURG & OCS PRODUCTS

GENERAL OFFICES, PARKERSBURG, W. VA.
Plants at Parkersburg, W. Va., Coffeyville, Kan., Houston, Texas
District Offices:
Dallas - Houston - Los Angeles - Tulsa - New York

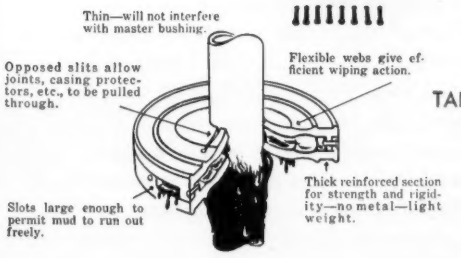
OCS

PARKERSBURG

Clean Pipe

WITH THE

TANDEM Pipe Wiper


Thin—will not interfere with master bushing.
Flexible webs give efficient wiping action.
Opposed slits allow joints, casing protectors, etc., to be pulled through.
Thick reinforced section for strength and rigidity—no metal—light weight.
Slots large enough to permit mud to run out freely.

Patterson-Ballagh announces the new, field proven TANDEM Pipe Wiper. Easier to install than two single pipe wipers, this efficient TANDEM will wipe your drill pipe *clean* no matter how *fast* you come out of the hole.

REPLACEABLE HALVES FOR ECONOMY—Identical halves and light hard rubber pins make up the TANDEM. Should either half become worn, only that half need be replaced. Each replacement half supplied with new pins. Halves easily assembled into rigid unit.

TANDEM WIPER FOR EFFICIENCY—Any mud the lower wiper misses, the upper wiper is sure to get. Wipers are spaced far enough apart to prevent mud caking, yet close enough so there is no interference with master bushing.

For top pipe wiper performance, use the new Patterson-Ballagh TANDEM on your rig. For more information, write for Bulletin No. 2-48.

PATTERSON BALLAGH · SEAL OF QUALITY · OIL FIELD SPECIALTIES ·

Specify

PATTERSON-BALLAGH

DIVISION OF BYRON JACKSON CO.

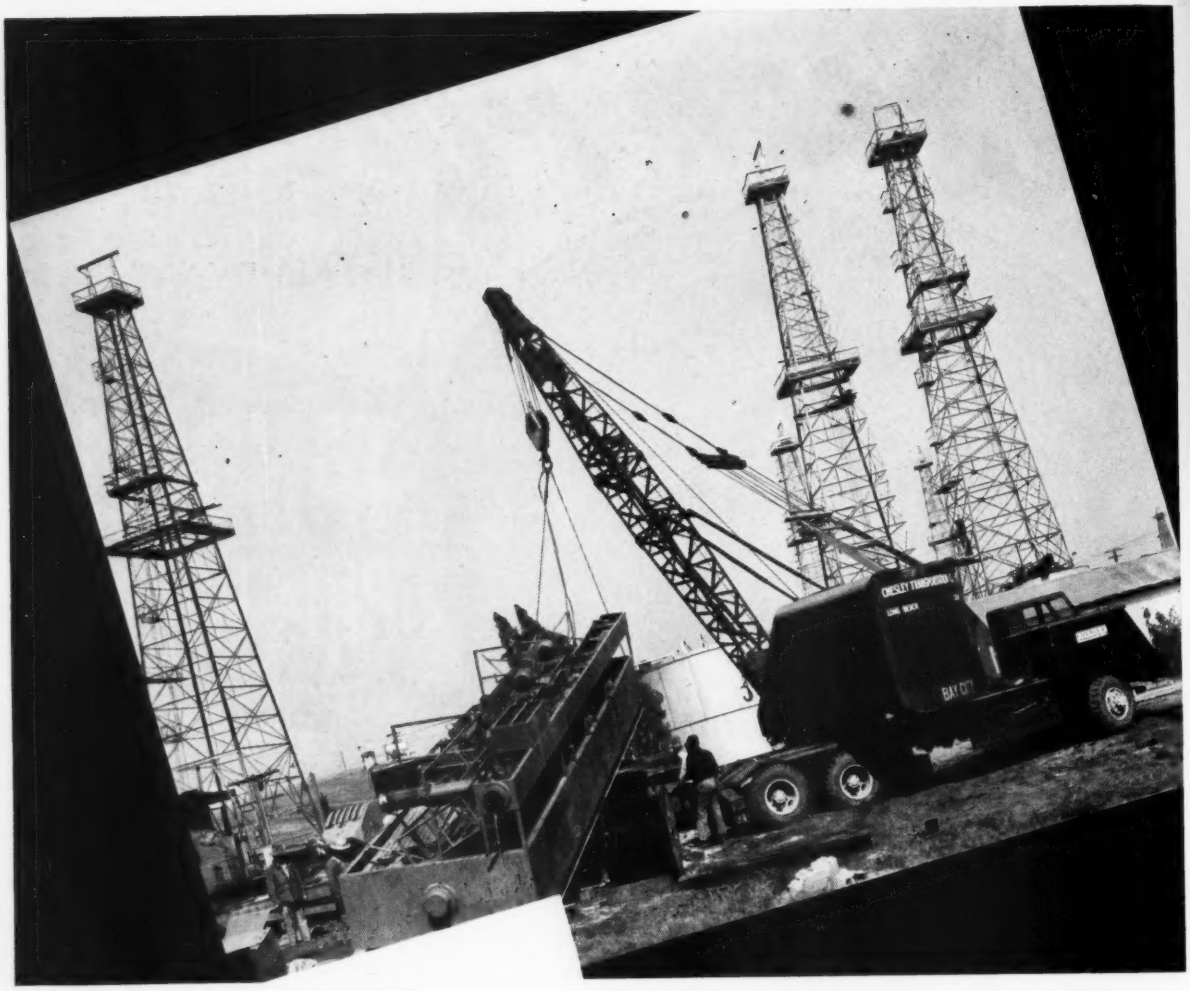
22 Years of Service to the Oil Industry

TANDEM PIPE WIPERS

MAIN OFFICE: 1900 EAST 65th STREET, LOS ANGELES 1, CALIFORNIA

6247 Navigation Blvd., Houston 11, Texas • 808 Graybar Bldg., New York 17, N. Y. • 330 Russ Bldg., San Francisco 4, Calif.

T.I.P.S.A., Santiago Del Estero 286, Buenos Aires, Argentina



BAY CITY CRANEMOBILE—A STURDY VERSATILE WORKER IN ANY OIL FIELD

This BAY CITY CraneMobile, operated by the Chesley Transportation Co., of Long Beach, California, is a welcome worker in California oil fields because of its ready mobile power, versatility and big lifting capacity. The BAY CITY CraneMobile has a rated lifting capacity of 20 tons and will handle long booms and jibs. Specially designed carrier available with four and six wheel drive. CraneMobiles are familiar sights when heavy equipment must be moved, large storage tanks built, or drilling rigs erected. For complete data on this oil field worker see your nearest dealer or write direct.

BAY CITY

SHOVELS • CRANES • HOES • DRAGLINES • CLAMSHELLS

BAY CITY SHOVELS INC., BAY CITY, MICHIGAN See your nearest Bay City dealer for excavating and material handling equipment in sizes from ⅜ to 1¼ yard with crane rating up to 20 tons. Both crawler and pneumatic tire mountings.

This Murray Molded Hendershot Valve Insert is a

tough customer

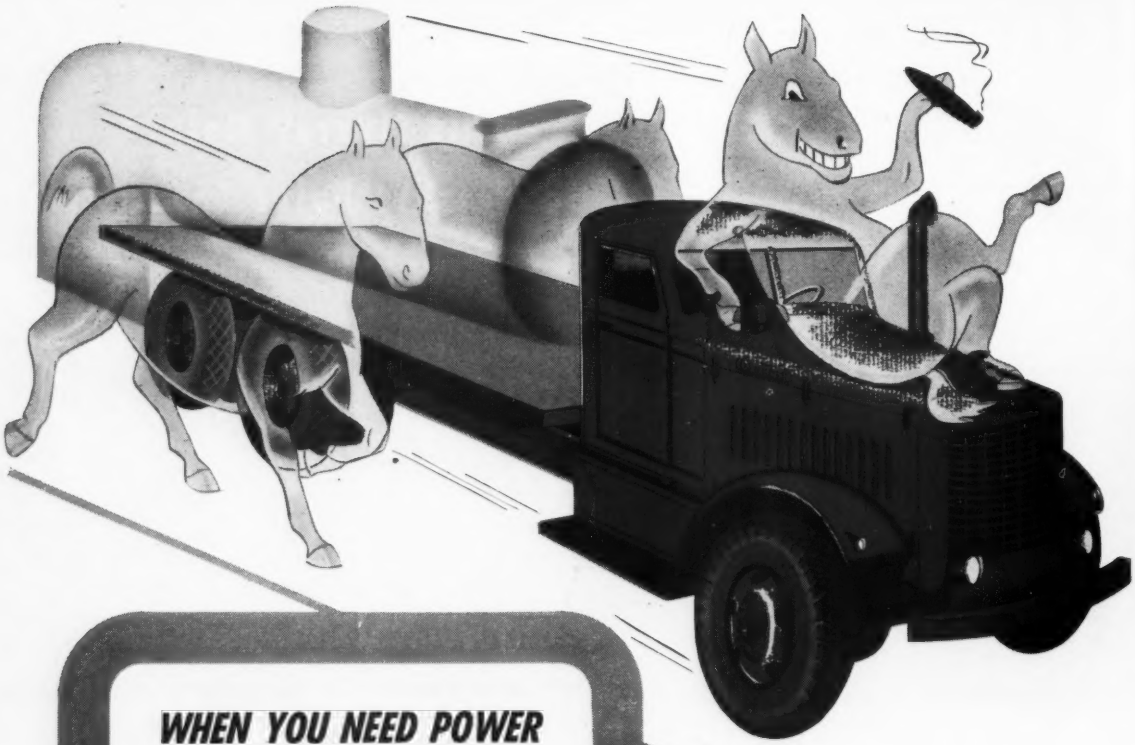
A slush pump valve insert must not swell or distort, must have high tensile strength and elasticity, must resist crude oil, gas, caustics and abrasion. In other words, it must be a "tough customer". And that is exactly what the Hendershot Valve Insert is.

Here, again, Murray's wide experience in compounding and molding Hycar oil-resistant rubber for the petroleum industry has paid-off for another equipment manufacturer.

You, too, may find the solution to your rubber problems at Murray, where one of the nation's largest producers of mechanical rubber goods is augmented by complete engineering and machine shop facilities for the design and manufacture of customer's molds, dies, metal inserts and custom machine work.

MURRAY RUBBER CO.
HOUSTON TEXAS

Murray Rubber



WHEN YOU NEED POWER ON ALL SIX WHEELS,— BUY OSHKOSH

OSHKOSH GETS THERE *Quickly — Economically*

Mid-Continent Representatives

GARDNER PRICE CO.
Wright Bldg., Tulsa, Okla.

OSHKOSH
4 - and 6 WHEEL DRIVE TRUCKS FOR OIL FIELDS

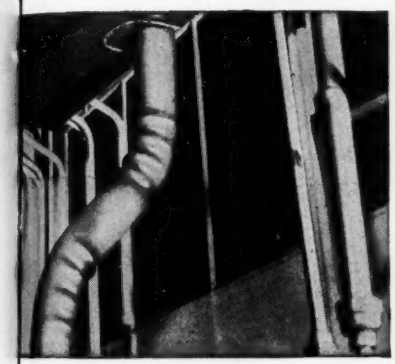
OSHKOSH MOTOR TRUCK, INC.
Oshkosh, Wisconsin

On the highway, Oshkosh trucks roll right along . . . Through "tough" terrain, Oshkosh is sure to "deliver the goods" — meaning quicker travel time — assuring that equipment is at the spot when needed, thus saving valuable time on the job.

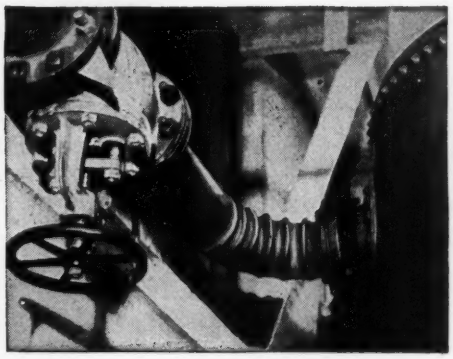
The specially designed features of Oshkosh Trucks result in economical operation — Front wheel drive is available when required, and can be cut off when not required. Sturdy construction reduces repair costs to almost zero — For example, only 1½ per cent repair time in over 13,000 hours of operation — typical of Oshkosh's championship performance.

XUM

"Tailor-Made" Bends

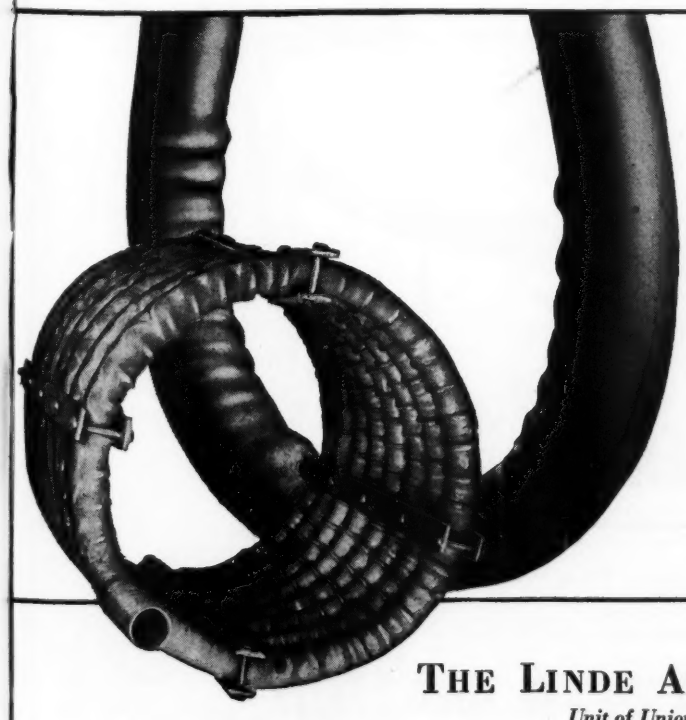


Where compound bends are required in a continuous section of pipe, wrinkle-bends offer an ideal solution. Wrinkle-bends are leakproof, as strong as the pipe itself, require no maintenance, and are easy to insulate.



This short-radius wrinkle-bend joins a compressed air line to a reservoir. Wrinkle-bends can be made in brass, copper, aluminum, and steel pipe from 2 inches to 26 inches in diameter.

Pipe bends can be made right on the spot with the aid of an oxy-acetylene welding or heating blowpipe, a simple bending rig, and a few common tools. Wrinkle-bending does not reduce the thickness of pipe walls.



This condenser coil made from 2-inch stainless steel pipe has 350 wrinkle-bends.

There are many LINDE methods for forming, cutting, joining, and treating metals. LINDE engineering service is always on call to help customers with production, construction, and maintenance jobs. Just call the nearest LINDE office.

The word "Linde" is a registered trade-mark of The Linde Air Products Company.

Linde

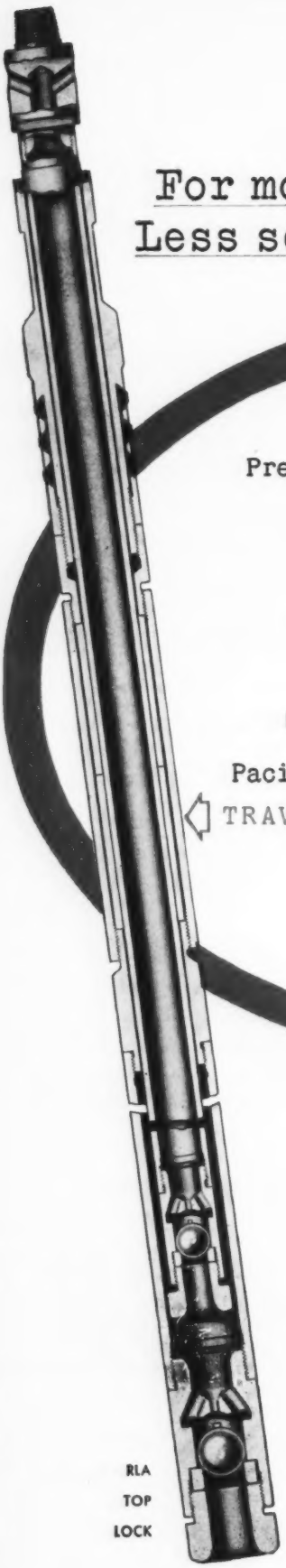
THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

30 East 42nd St., New York 17, N. Y. UCC Offices in Other Principal Citie

In Canada: DOMINION OXYGEN COMPANY, LIMITED, Toront

For more service in your well...
Less servicing at the surface!



Specify Pacific
Precision Built Oil Well Plunger Pumps

Require Less Servicing at the Surface Because
of Maximum Protection for the Critical Zone
By Selecting Materials for

Plungers · Liners · Valves
Valve Seats · Valve Cages

To resist corrosion and finished with the
hardness necessary TO RESIST ABRASION AND WEAR.

Pacific Oil States Sectional Liner Pumps

TRAVELING PLUNGER TYPE

TRAVELING BARREL TYPE

Built to API Standards
with Pacific Precision Finish

PACIFIC
Precision Built
PUMPS

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One of the Dresser Industries
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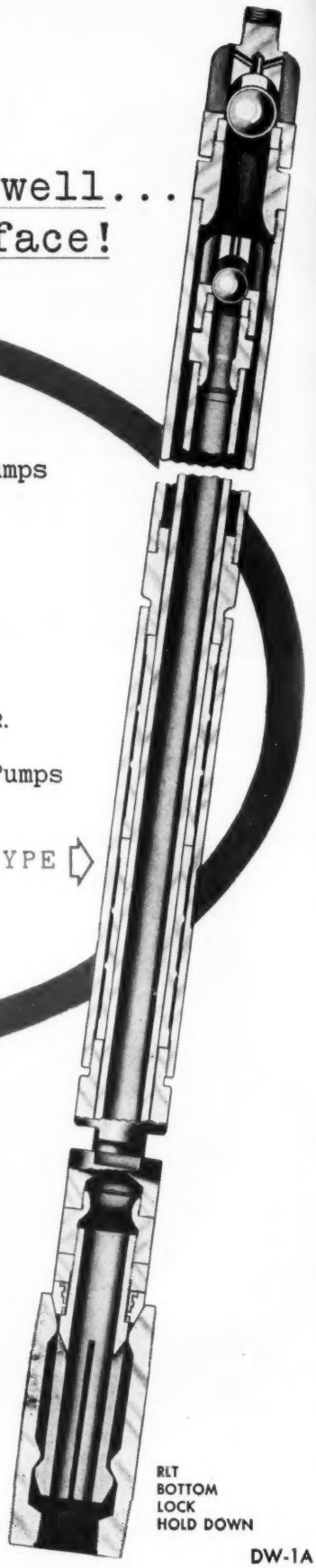
Mid Continent Division
915 E. 2nd St., Tulsa, Okla.
Export Office: Channin Bldg., 122 E. 42nd St.
New York, N. Y.
Offices In All Principal Cities



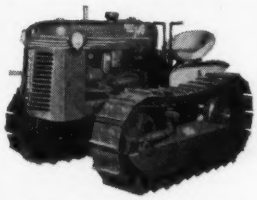
RLA
TOP
LOCK

RLT
BOTTOM
LOCK
HOLD DOWN

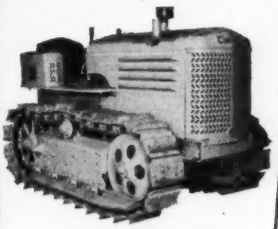
DW-1A

XUM

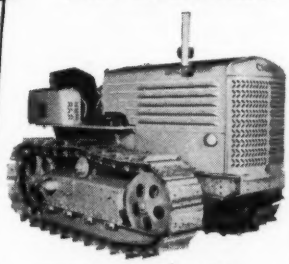
take your pick of PERFORMANCE



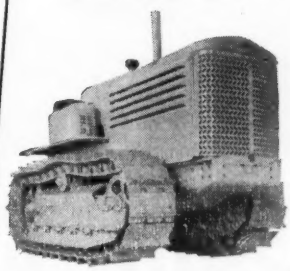
OLIVER-Cletrac Model HG



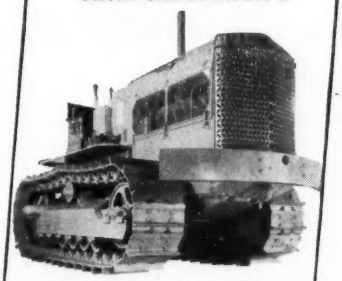
OLIVER-Cletrac Model A



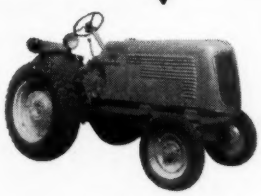
OLIVER-Cletrac Model B



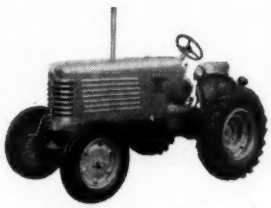
OLIVER-Cletrac Model D



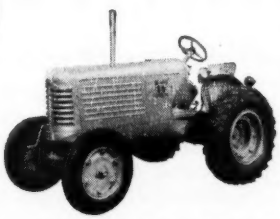
OLIVER-Cletrac Model F



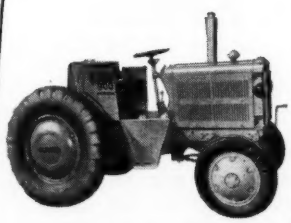
OLIVER "60" Industrial



OLIVER "77" Industrial



OLIVER "88" Industrial



OLIVER "900" Industrial

• From the complete line of Oliver "Cletrac" Crawler Tractors and Oliver Industrial Wheel Tractors you can pick exactly the tractor you need and be assured of performance *in advance.*

The finest in industrial machinery is more than a slogan to Oliver . . . it is an accomplished fact that has been proved in year after year of outstanding performance. Design, materials, workmanship, and plant equipment are all based on one standard . . . the built-in dependability that adds up to more years of service in the field . . . lower operating and maintenance costs to you.

Combine this unsurpassed dependability with the *extra* service offered by your Oliver "Cletrac" Distributor . . . a complete line of industrial crawler and wheel tractors . . . a full line of allied equipment . . . complete service facilities and adequate stocks of genuine Oliver "Cletrac" repair parts . . . plus a broad background of field experience . . . and you'll see why you can take your pick of performance.

"THE SIGN OF EXTRA SERVICE"

OLIVER Cletrac SALES SERVICE

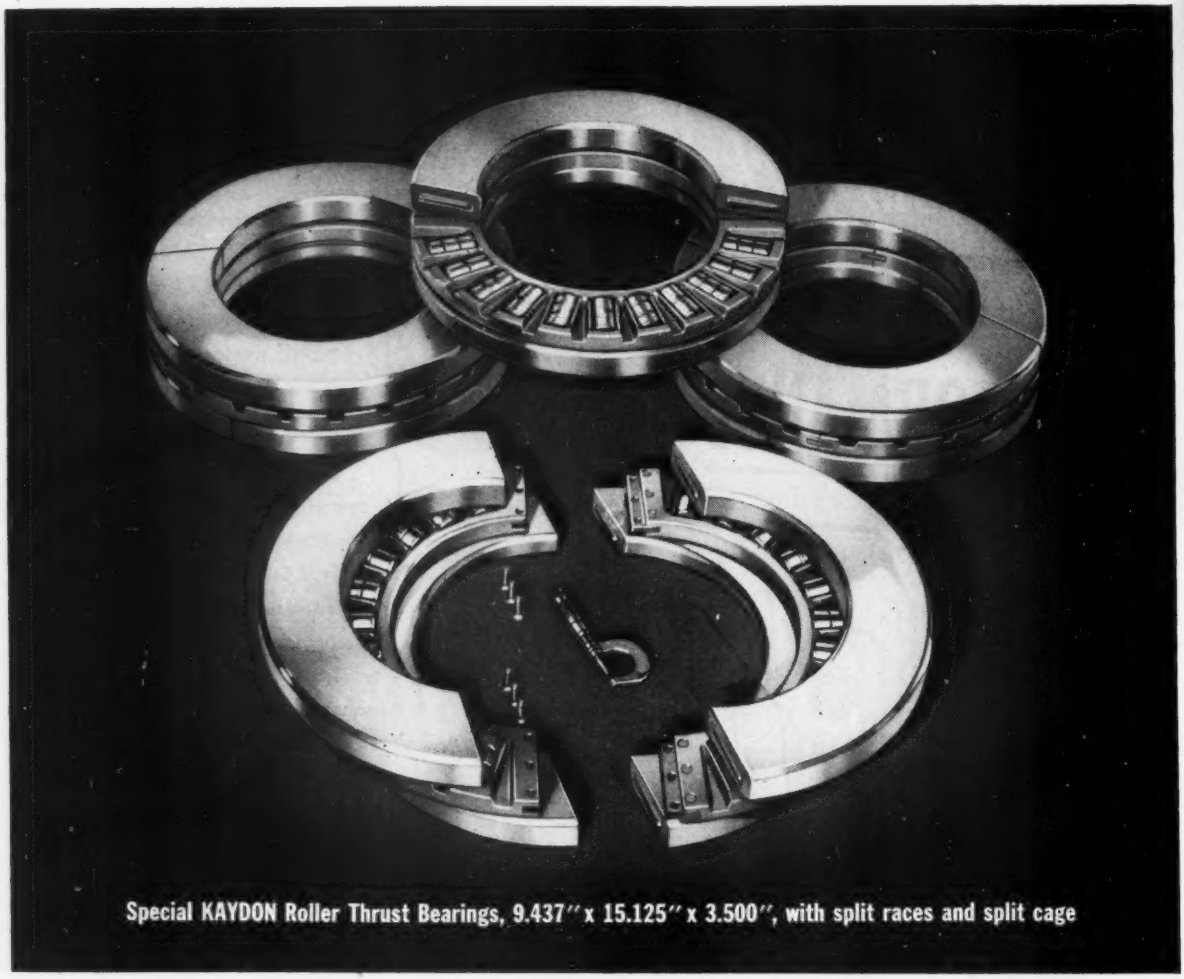
Cletrac

a product of

The OLIVER Corporation

Industrial Division, 19300 Euclid Avenue, Cleveland 17, Ohio

A Complete Line of Crawler and Industrial Wheel Tractors



Special KAYDON Roller Thrust Bearings, 9.437" x 15.125" x 3.500", with split races and split cage

KAYDON *Split* BEARINGS

Easy to put on or take off without dismantling machine

EASY on . . . easy off! These special **KAYDON** Roller Thrust Bearings have split races and a split cage . . . so you don't have to dismantle the machine to assemble them into position or to remove them from the shaft. There are many applications where this unique type of bearing is a big saver of time and money.

The precision engineering and ingenuity which make these special bearings perform so successfully are major factors in **KAYDON** procedure to assure dependable quality, rugged strength, and high precision in all **KAYDON** standard and special bearings . . . from 4" bore to the extremely large **KAYDON** Bearings, up to 10 feet outside diameter. • In many fields of heavy-duty machinery, **KAYDON** Bearings help designers add important advantages. Steel mill equipment that operates under terrific loads and high temperatures, mammoth paper mill machinery, huge precision grinders, rugged road-building units, excavators, hoists, crushers, bending machines and other heavy-duty machines, are serving industry better because of **KAYDON** Bearings.

* * *

Expand your opportunities through use of these modern bearings. Capacity now available for all types and sizes. Contact **KAYDON**, in confidence!

KAYDON *Types of Standard or Special Bearings:*
Spherical Roller • Taper Roller • Ball Radial
Ball Thrust • Roller Radial • Roller Thrust

THE KAYDON ENGINEERING CORP., MUSKEGON, MICH.

All types of Ball and Roller Bearings 4" bore to 120" outside diameter

BOVAIRD has the

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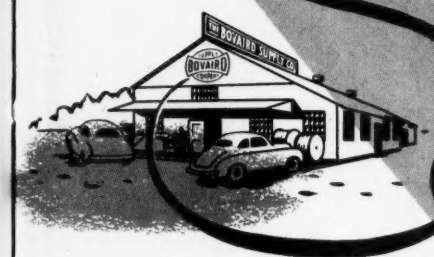


TO SATISFY ITS *Customers*

STORES are strategically located throughout Illinois, Kansas, Oklahoma and Texas to give you the quick service you need.

STOCKS are complete — and the finest available — to give you the supplies you need.

SERVICE is assured by experienced supply men fully qualified to give you prompt and careful attention.

"Buy From Bovaird"

SUPPLY BOVAIRD COMPANY

OFFICES AND STORES

ILLINOIS—Clay City, Grayville, Salem
KANSAS—Chase, McPherson, Pratt, Russell, Wichita
OKLAHOMA—Duncan, Oklahoma City, Pauls Valley, Sapulpa, Seminole
TEXAS—Borger, Dallas, Odessa, Pampa

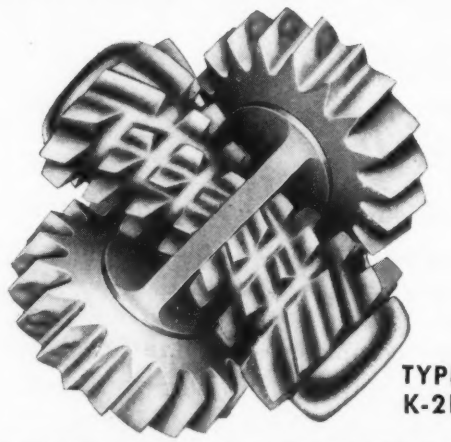
THE BOVAIRD SUPPLY CO.

GENERAL OFFICES: TULSA, OKLAHOMA

Teeth are important on Rock Bits, too!

There are 11 types of H. C. Smith Rock Bits—each with specially designed teeth to drill specific formations.

You get *FASTER, STRAIGHTER, FULL GAUGE HOLE* by choosing the H. C. Smith Rock Bit with the right tooth design for the formation encountered.



TYPE K-2P

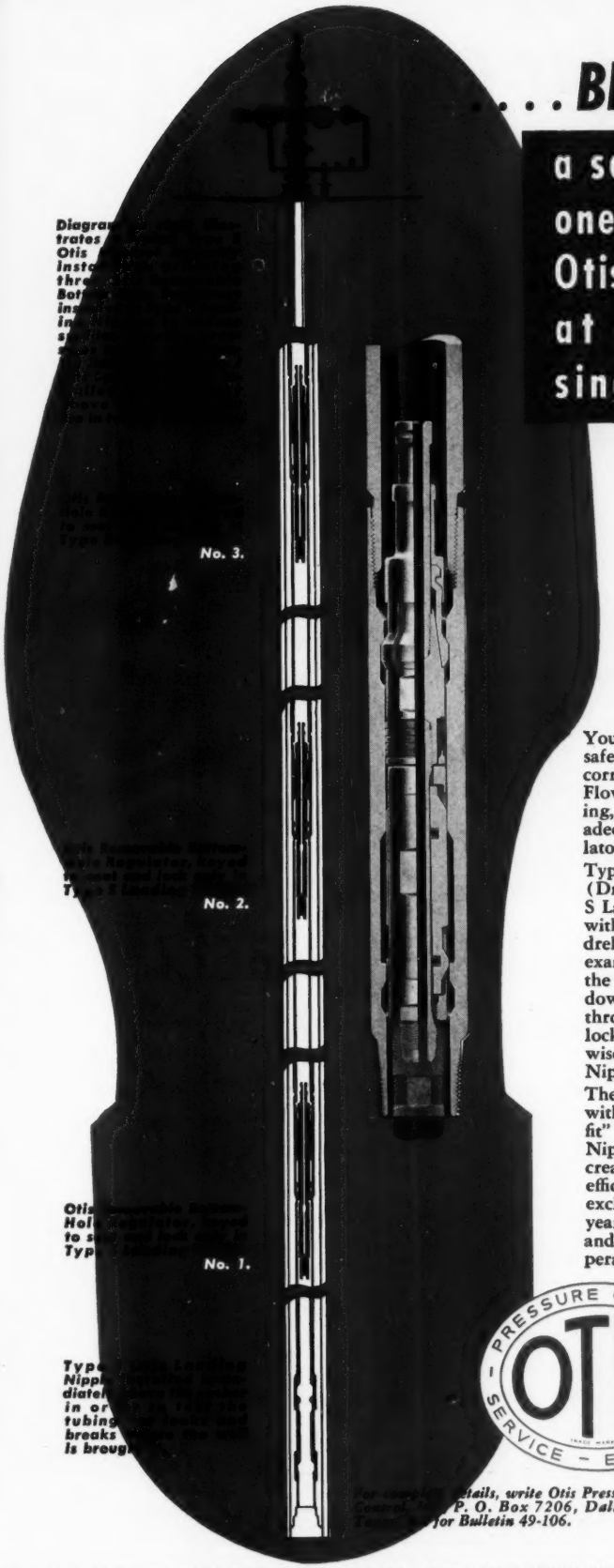
H.C. SMITH ROCK BITS

H C Smith OIL TOOL CO.

GENERAL OFFICES AND PLANT: P.O. BOX 431, COMPTON, CALIF.

. . . BIG STEP FORWARD

a safer method of setting one, two, three, or more, Otis Sub-Surface Controls at desired depths in a single string of tubing!



new TYPE S MANDREL ASSEMBLIES installed in TYPE S LANDING NIPPLES

Your next high-pressure well can have simpler and still safer sub-surface control. One, two, three, or more new corrosion-resistant Type S Otis Landing Nipples (and Flow Couplings), run at desired intervals with the tubing, will afford definitely located seats for landing an adequate number of Otis Removable Bottom Hole Regulators, Tubing Safety Valves, and Bottom Hole Chokes.

Type S Otis Landing Nipples are essentially full-opening. (Drift diameter of 2" tubing = 1.901"; I. D. of 2" Type S Landing Nipple = 1.875".) Each Nipple is "profiled" within its bore to accept only one specific Type S Mandrel Assembly having a matching set of "keys." For example, the Type S Mandrel with #1 keys, and carrying the desired sub-surface control mechanism, can be run down the tubing under pressure on a steel measuring line through all upper Type S Landing Nipples, to select and lock positively only in Type S Landing Nipple #1. Likewise, the Assembly having #2 keys can be set only in Nipple #2, etc.

The new Type S Otis Mandrel Assemblies are equipped with fully-supported V-type packing which effect a "slide fit" within the machined bore of the Type S Landing Nipple to eliminate the necessity of flowing the well to create an initial shutoff, and are constructed with an efficient metal-to-metal locking mechanism. These two exclusive design features have been used successfully for years (in Type J Otis Mandrel Assemblies) to pack-off and lock Otis Sub-Surface Controls under extreme temperature and pressure conditions.

PRESSURE CONTROL — OTIS — SERVICE – EQUIPMENT

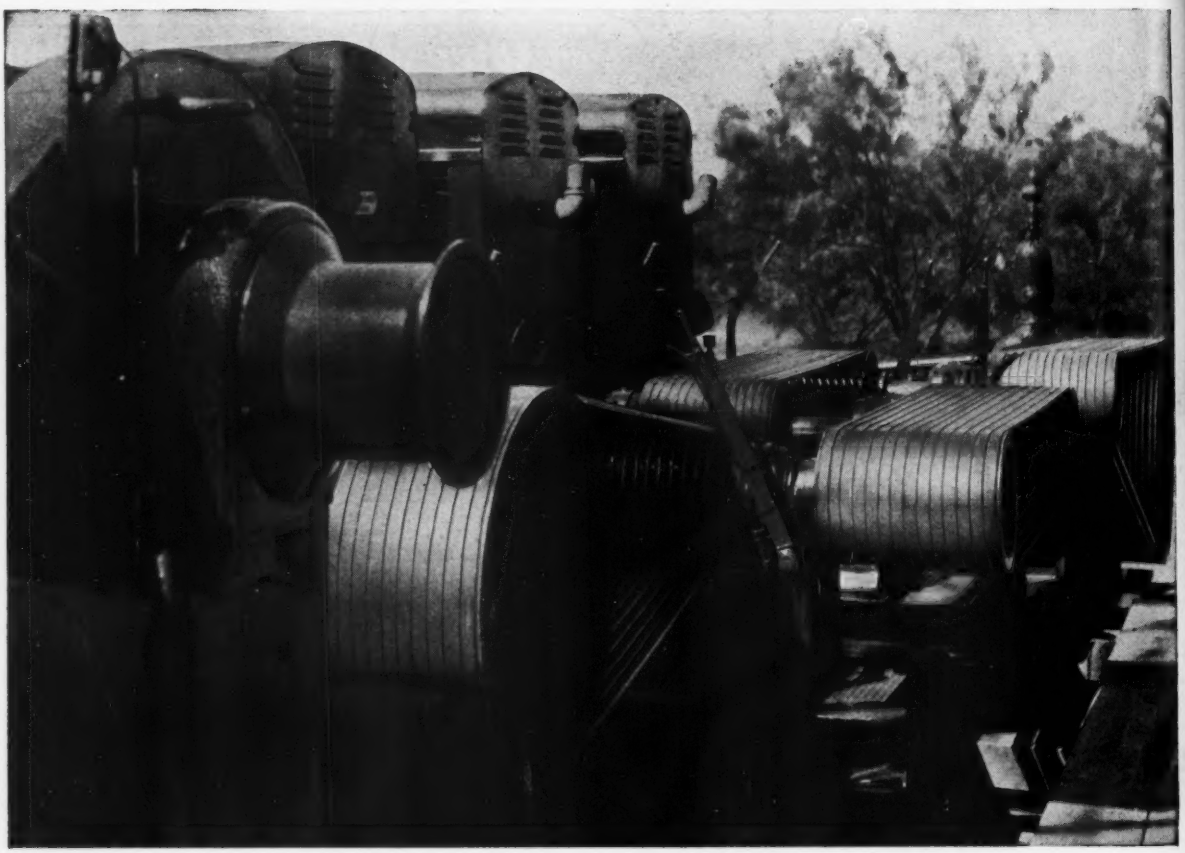
OTIS PRESSURE CONTROL, INC.
TYPE S MANDREL ASSEMBLY

tails, write Otis Pressure P. O. Box 7206, Dallas, for Bulletin 49-106.

(T-25)

DISTRIBUTORS: **OTIS PRESSURE CONTROL, INC.**, DALLAS, TEX.; **OTIS EASTERN SERVICE, INC.**, BOLIVAR, N. Y.; **WESTERN PRESSURE CONTROL**, LOS ANGELES, CALIF. FIELD OFFICES: **TEXAS:** HOUSTON, CORPUS CHRISTI, FALFURRIAS, VICTORIA, ODESSA, and LONGVIEW. **OKLAHOMA:** OKLAHOMA CITY. **LOUISIANA:** NEW IBERIA. **MISSISSIPPI:** BROOKHAVEN EXPORT SALES AND SERVICES: **OTIS PRESSURE CONTROL EXPORT, INC.**, POST OFFICE BOX 7206, DALLAS, TEXAS, U. S. A.; CARACAS, SOUTH AMERICA MANUFACTURE AND DEVELOPMENT: **OTIS ENGINEERING CORPORATION**, POST OFFICE BOX 7206, DALLAS, TEXAS, U. S. A.

Gilmer has the PULL



GILMER MULTIPLE V-BELTS
add a "PLUS" to power for Oil Field Service

The firm, non-slip grip of Gilmer Multiple V-Belts assures smooth, even transmission of power. This is due, in part, to straight wall construction—as the belt flexes around sheaves, sides bulge outward; when pressure is released belts unlock freely and instantly.

The strong rayon pulling cords are conditioned to minimize stretch and tough, heavy jackets give long life.

Gilmer endless multiple V-Belts are made in all standard and many special sizes to meet every need in oil field service.

For flat belt drives, Gilmer manufactures complete lines of cut edge belts and the famous Kable Kord . . . "2 belts in one" . . . one for contact and one for power.

Where there's a power belt problem, there's a Gilmer belt solution.

Gilmer BELTS

Write today for FREE copy of the Gilmer Guide. It explains how you can get the best service from your V-Belt drives.

Gilmer engineers will be glad to help with any of your power belt problems.

BUY THROUGH YOUR GILMER DISTRIBUTOR

V-BELTS • FLAT BELTS • HOSE • PACKING • WIRE • TAPE

L. H. GILMER COMPANY, Tacony, Philadelphia 35, Pa.

Division of United States Rubber Company

Willingness to work with foresighted engineers and operators in their plans for equipment to meet expected but-as-yet unexisting conditions . . . ability to design and produce that equipment . . . plus the reputation established through more than a decade of service . . . these are the reasons why W-K-M VALVES were specified on this immense Christmas Tree. It's the largest and heaviest ever built . . . designed for working pressures of 10,000 POUNDS PER SQUARE INCH!

True, 10,000 pound pressures have not yet been encountered, but when they are, W-K-M ALREADY HAS THE VALVES TO HANDLE THEM. And when still heavier equipment is required, you may rest assured that W-K-M will again have it ready.

20,000 pound test Christmas Tree, equipped 100% with W-K-M Valves, on display at Cameron Iron Works, Houston, Texas.

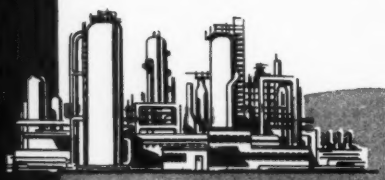
W-K-M Company, Inc.

OIL FIELD, PIPE LINE & INDUSTRIAL EQUIPMENT

HOUSTON, TEXAS, U. S. A.
LOS ANGELES

Cable Address: "WILKOMAC"
Export Office: 30 Rockefeller Plaza, New York, N. Y.

IT'S OUR JOB TO MAKE YOUR JOB EASIER



if your job is operational . . . drilling for oil, producing, transporting or refining it . . .

We can take the equipment and supply problems off your shoulders, so you can spend that important extra time on your main job.

Complete inventories here at Norvell-Wilder are geared to your needs. Our stocks are such that we are prepared to make *immediate* delivery on many scarce items.

if your job is purchasing . . .

We can help you by finding scarce equipment, gathering information on new equipment and how it works, and having supplies ready for immediate delivery when you need them.

For Dependable Service Call Your NORVELL-WILDER MAN

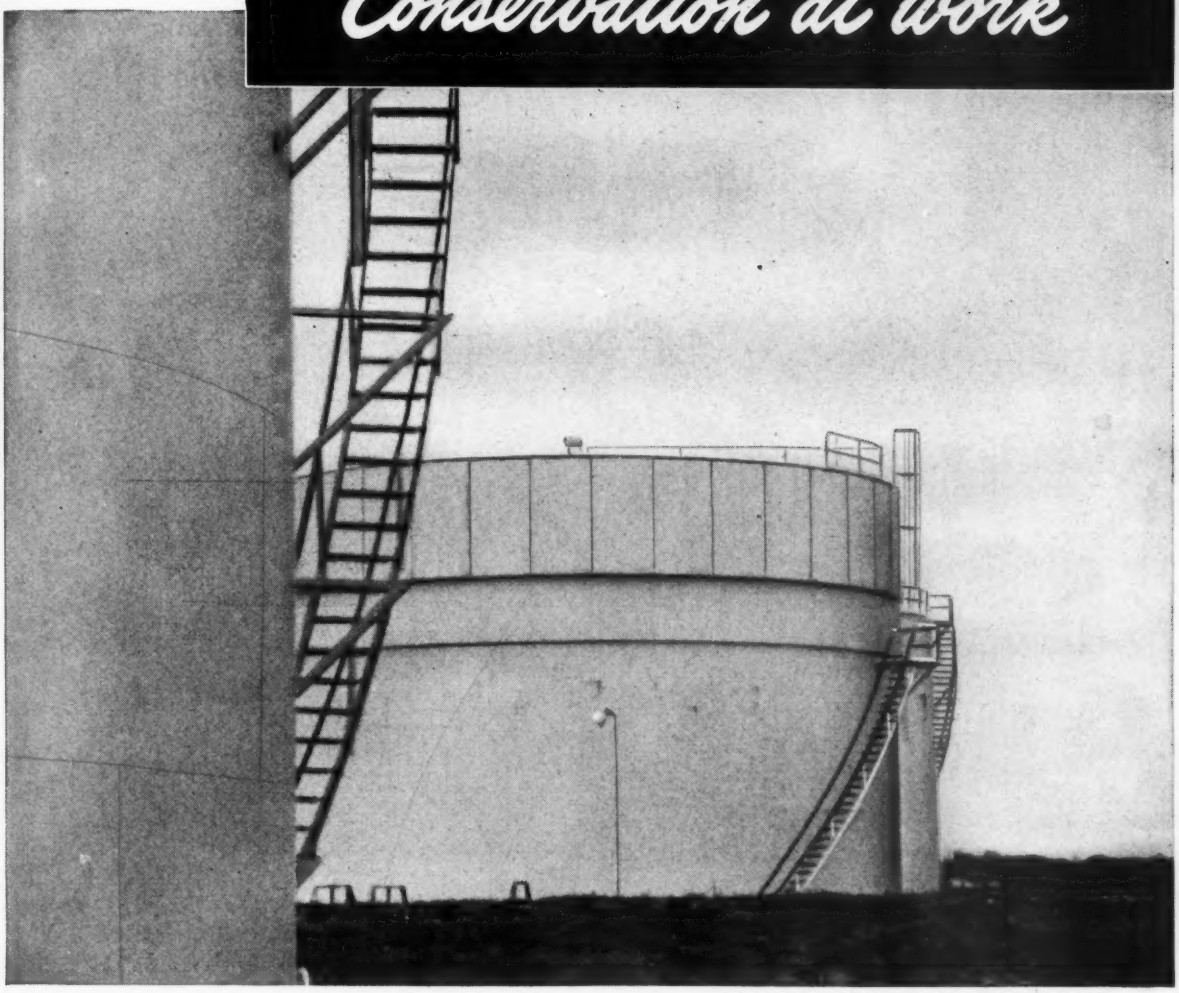
NORVELL-WILDER SUPPLY COMPANY

Regardless of what your job is, we can help you do it better and easier.

BEAUMONT • HOUSTON • SHREVEPORT • FORT WORTH • LAKE CHARLES • CONROE • ODESSA • CORPUS CHRISTI

XUM

Conservation at work



THE EXPANSION ROOF STOPS VAPOR LOSSES

Elimination of vapor losses . . . conservation through the use of Expansion Roof Tanks . . . has proved its value to producers, refiners and marketers alike, both in preventing the loss of salable product and in maintaining octane rating.

The Expansion Roof permits no venting to the atmosphere and no intake of moisture laden air. Instead, it rises to accommodate expanding vapors, lowers as the pressure decreases. Perfectly suited to either single or multiple tank installations (through manifolding) the Expansion Roof results in direct dollar savings wherever petroleum products are stored.

Call Graver today. Find out just what the installation of Graver conservation equipment will mean to you in terms of marketable product saved.

FABRICATED PLATE DIVISION

GRAVER TANK & MFG. CO., INC.

EAST CHICAGO, INDIANA

NEW YORK PHILADELPHIA CHICAGO CATASAUQUA, PA. HOUSTON SAND SPRINGS, OKLA.

THERE'S NOTHING AS FINE as the LUFKIN LINE

LUFKIN 35-9 with gas drive and sub-base. Tide Associated Oil Company, Creek, Mississippi.

LUFKIN pioneered and developed the application of reduction gears to oil well pumping. The first unit was placed in operation in a gulf coast field in 1923. In the more than a quarter century of specialization in the manufacture of walking beam type pumping units, Lufkin has attained the enviable position of number one producer of such equipment.

Applied skill, plus constant improvement in design and application of Lufkin units, has contributed to the maintenance of that position.

It shall be always the Lufkin objective to produce the very best unit in the field.

Yes sir! There is nothing as fine as the Lufkin Line!

LUFKIN

OUNDRY AND MACHINE CO., LUFKIN, TEXAS

nch sales and service Houston, Dallas, New York, Tulsa, Los Angeles, Seminole, lahoma City, Corpus Christi, Odessa, Kilgore, Wichita Falls, Casper, Wyoming; Great Bend, Kansas.

More than 60,000 commercial gear reducers and speed increasers—in full-line range of sizes, have been produced in our Lufkin plant under the supervision of men with more than a quarter of a century experience. Write for our latest catalog!

XUM

Producers
Refiners
Marketers

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Be <u>sure</u> with Pure

THE PURE OIL COMPANY

Marketing Offices in Principal Cities of the Eastern, Central and Southern States

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Take the gamble out of your oilfield hauling

WALTER TRACTOR TRUCKS haul on any terrain, —in any weather

BIG, POWERFUL Walter Tractor Trucks work when other trucks are stalled by bad weather or bad running conditions. This is a tremendous factor in reducing your losses from tied up rigs, equipment and crews.

The big difference between Walter Tractor Trucks and all other trucks, is the 4-Point Positive Drive. All four driving wheels have 100% Positive Traction, made available by three patented automatic locking differentials. There is never wheel-spinning to bog down trucks on sand, mud, soft ground, slippery surfaces, steep grades.

Step up your productive time—lower your costs, by hauling portable rigs, pipe and servicing equipment with Walter Tractor Trucks. Write today for detailed folder describing the many unusual features of Walter Tractor Trucks for off-the-road hauling.

WALTER MOTOR TRUCK CO. 1001-19 Irving Ave., Ridgewood 27, Queens, L. I., N. Y.

WALTER
4-POINT POSITIVE DRIVE
TRACTOR TRUCKS

Just right

RIGHT Reducer
RIGHT Structure
RIGHT Bearings
RIGHT Accessories

EVERY Cabot unit is just right for its well—never too big or too small.

This perfect fit is possible thru a unique plan of interchangeable reducers, structures, bearings and accessories exclusive with Cabot. You not only save on first cost but also on power and maintenance by having just the right equipment.

There are other important Cabot advantages which the pumping unit specialist at your near-by Jones & Laughlin Supply store will be glad to explain. Lend an ear; he has important things to tell you.

Export: 230 Park Ave., New York 17, N. Y., U. S. A.

JONES & LAUGHLIN SUPPLY COMPANY

Subsidiary of Jones & Laughlin Steel Corporation

TULSA, OKLAHOMA

J&L STEEL

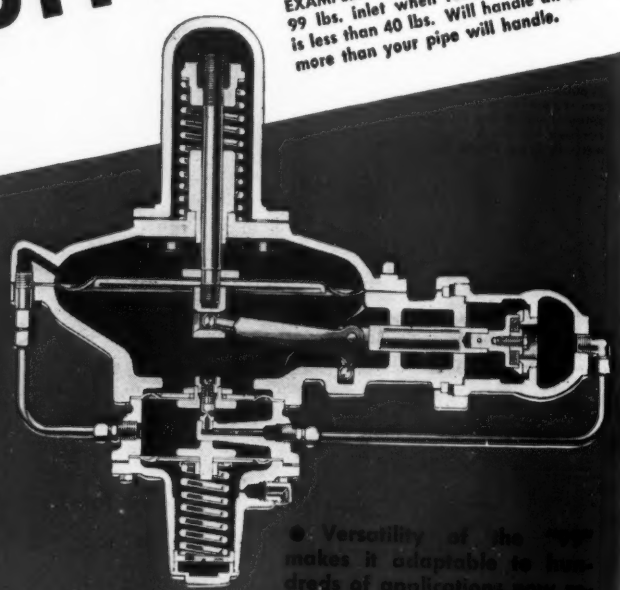
1 STABILITY
2 ACCURACY
3 CAPACITY

Designed and built with inherent stability for low and high flows, as well as low and high pressure conditions. Eliminates any pulsating — will not cycle or hunt.

Controlled pressure does not vary more than 3" WC from no-flow to full-flow, regardless if reduced pressure is in ounces or up to 50 lbs.

Accurate control is assured for all flow ranges and reduced pressure ranges from 4 oz. to 50 lbs. High capacity assured since inner valve can open to give full orifice area.

EXAMPLE: Will pass 99,000 CFH at 99 lbs. inlet when reduced pressure is less than 40 lbs. Will handle all or more than your pipe will handle.



FISHER "99"

MULTI-PURPOSE PRESSURE REDUCING REGULATOR ....

- Versatility of the "99" makes it adaptable to hundreds of applications now requiring an assortment of several types of regulators.

Exclusive mechanical and operating features provide unexcelled performance.

Overload trip insures shut-off in event reduced pressure tends to rise too high.

One body size (2" screwed) and one orifice size handle full range of capacity and pressure conditions.

Single seated orifice with composition valve disc gives tight closure when needed.

Compact design allows easy installation in limited space, in any position.

For complete details write for Fisher Bulletin P-99.

FISHER GOVERNOR CO.

2323 FISHER BUILDING, MARSHALLTOWN, IOWA

EASY DOES IT... FAST!

Quick stabbing and fast spinning are but two of the *many* advantages resulting from the consistent uniformity of Republic Electric Weld Casing and Tubing.

Equally important are the pull-out protection and resistance to collapse which you get in every length—assured by uniform wall thickness, uniform roundness, uniform strength and soundness—each resulting from Republic's *improved* process of electric resistance welding. Each length is formed from high ductility steel... fully normalized for uniform structure. Casing is cold sized for high yield strength.

Yes, easy does it . . . fast—*and safely, too,* when you use Republic Electric Weld Casing and Tubing.

Republic Electric Weld Casing and Tubing are made from flat-rolled steel, both sides of which are inspected. Thus, the surface which becomes the inside wall is free from hidden defects.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department:
Chrysler Bldg., New York 17, N. Y.

REPUBLIC *Electric Weld*
NORMALIZED CASING AND TUBING

REPUBLIC STEEL
REG. U.S. PAT. OFF.

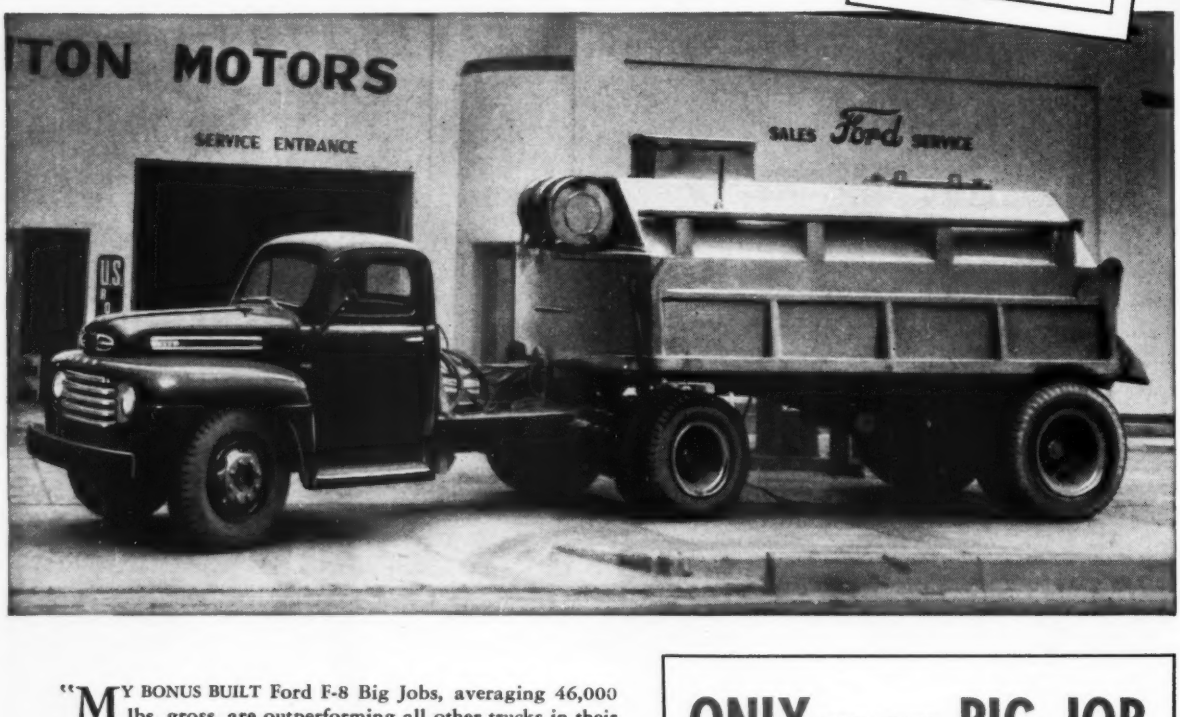
Other Republic Products include Line Pipe—Carbon, Alloy and Stainless Steels—Upson Studs, Bolts and Nuts—Electrunite Heat Exchanger Tubes

"FORD F-8 Big Jobs outperform all other trucks in their class!"

Roadside Report

FORD Bonus Built TRUCKS

JAMES L. DIGGS
KINGMAN
ARIZONA



"MY BONUS BUILT Ford F-8 Big Jobs, averaging 46,000 lbs. gross, are outperforming all other trucks in their class," reports Mr. James L. Diggs. "Gas mileage is 6 miles per gallon. The engine on one F-8 has never felt a wrench, except for changing one set of points and two fan belts. My run takes us over a mountain range and through the intense heat of the Colorado River Valley."

Mr. Diggs is one of many big-time haulers who give the Ford Big Jobs a great big hand. Owners report the 145-horsepower engine outperforms anything in its class. They offer plenty of proof that it outsaves many engines much smaller in size. Drivers report that the new Ford Million Dollar Cab can't be beat for comfort. Ford Big Jobs for '49 are Bonus Built . . . like the other 139-plus models in the full line of Ford Trucks. Bonus Built is the superstrong construction that contributes to long truck life. Life insurance experts prove Ford Trucks last longer.

ONLY THE FORD BIG JOB HAS ALL THESE FEATURES!

- ★ New 145-h.p. Ford V-8 engine for top performance.
- ★ Ford exclusive concentric dual-throat carburetor for more power, more economy.
- ★ New heavy duty 5-speed transmissions for operating flexibility.
- ★ Big Ford power-operated brakes for sure-footed stopping; rear 16-inch by 5-inch on the F-8.
- ★ Ford Super Quadrax 2-speed axle with vacuum shift for performance flexibility in Model F-8 (single speed axle also available); single-speed Quadrax Hypoid Axle in Model F-7.
- ★ Large diameter (10-inch) wheel bolt circle with 8 studs to allow for extra-strong hub construction.
- ★ Million Dollar Cab with Ford Exclusive Level Action suspension for greater driving comfort.
- ★ Nationwide service from over 6,400 Ford Dealers.
- ★ Ford Bonus Built construction for long truck life.

Gross Vehicle Weight Ratings: F-8 up to 21,500 lbs., F-7 up to 19,000 lbs. Gross combination ratings: F-8 up to 39,000 lbs., F-7 up to 35,000 lbs.

FORD 1949 *Bonus Built* TRUCKS 1949

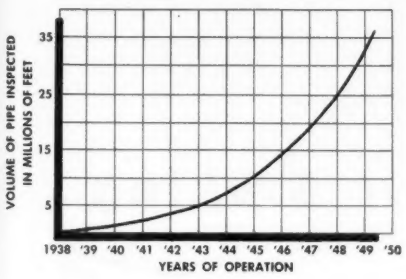
BUILT STRONGER TO LAST LONGER

USING LATEST REGISTRATION DATA ON 5,444,000 TRUCKS, LIFE INSURANCE EXPERTS PROVE FORD TRUCKS LAST LONGER!

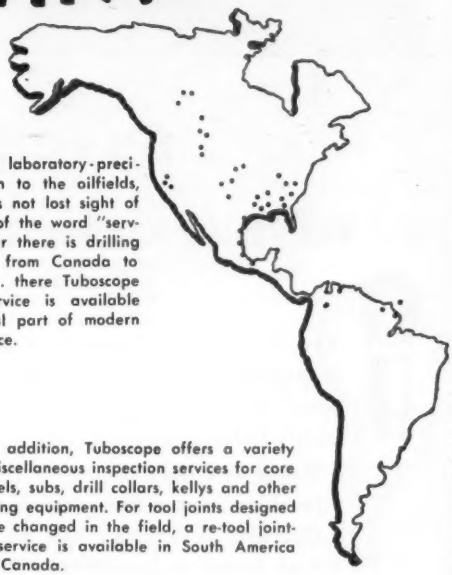
IN SELECTING TUBULAR INSPECTION SERVICE, LOOK FOR THESE ESSENTIAL QUALIFICATIONS:

Long-experienced Personnel
Most Complete Technical Facilities
Hemisphere-wide Availability

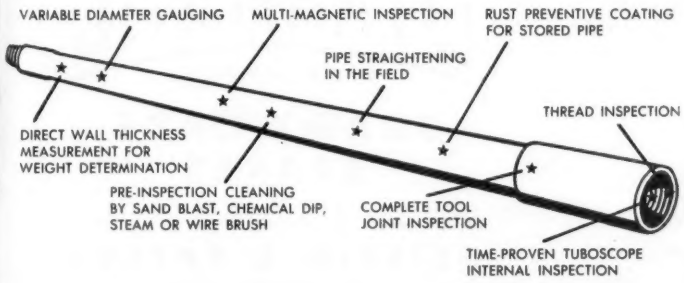
ONLY Tuboscope OIL FIELD TUBULAR INSPECTION OFFERS ALL THREE!



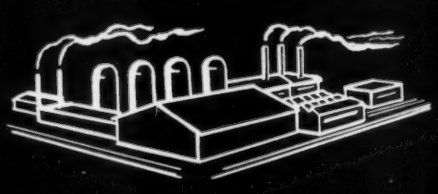
In a business as highly specialized as pipe inspection, experience is of paramount importance to high quality work. Every Tuboscope inspection is backed by 35 million feet of experience!



In bringing laboratory-precision inspection to the oilfields, Tuboscope has not lost sight of the meaning of the word "service". Wherever there is drilling activity . . . from Canada to Colombia . . . there Tuboscope Inspection service is available as an integral part of modern drilling practice.


VARIABLE DIAMETER GAUGING
MULTI-MAGNETIC INSPECTION
RUST PREVENTIVE COATING FOR STORED PIPE
PIPE STRAIGHTENING IN THE FIELD
THREAD INSPECTION
DIRECT WALL THICKNESS MEASUREMENT FOR WEIGHT DETERMINATION
PRE-INSPECTION CLEANING BY SAND BLAST, CHEMICAL DIP, STEAM OR WIRE BRUSH
COMPLETE TOOL JOINT INSPECTION
TIME-PROVEN TUBOSCOPE INTERNAL INSPECTION

In addition, Tuboscope offers a variety of miscellaneous inspection services for core barrels, subs, drill collars, kellys and other drilling equipment. For tool joints designed to be changed in the field, a re-tool jointing service is available in South America and Canada.



Of special value to operators in foreign fields is Tuboscope's New Pipe Inspection Yard in the Pittsburgh area. Here, new pipe can be graded before shipment to distant points.

Tuboscope
DIVISION OF
TUBULAR SERVICE & ENGINEERING CO.
COMMERCE BLDG. HOUSTON, TEXAS

BRANCH OFFICES:

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WICHITA FALLS, NEW IBERIA,
SHREVEPORT, BROOKHAVEN,
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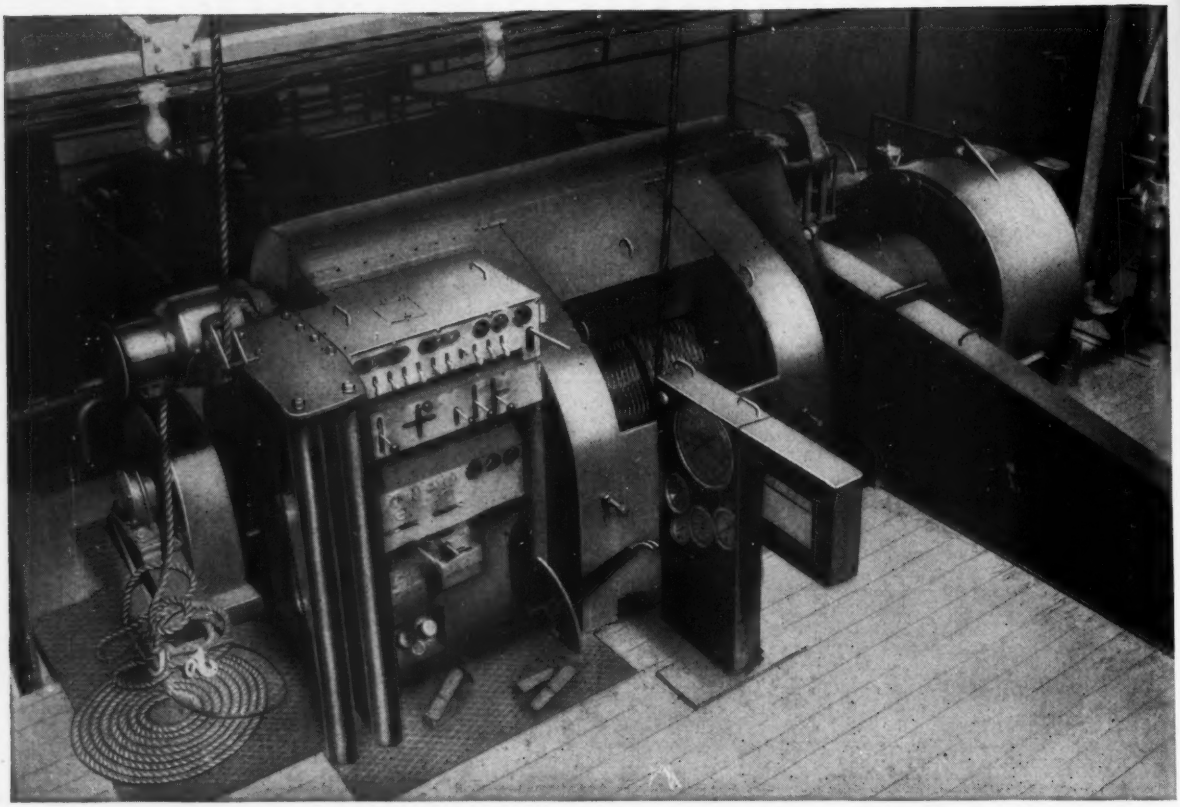

Speed Up Round Trips with Frictionless Magnetic Braking

The Dynamatic Drawworks Brake is completely magnetic; no friction or wear; no brake blocks or bands to replace. Proved by outstanding records in all fields, including off-shore operations.

- Simple as a light circuit.
- Precision control from driller's position.
- Operates on ordinary light plant current.
- High torque at low speeds.
- Sets slips on heaviest strings without friction brake.
- Readily applied to all rigs—large or small. Can be installed in the field.
- Sold with unconditional guarantee of satisfaction.

Dynamatic Drawworks Brakes are available from drawworks manufacturers and their distributors. Write for illustrated literature.

DYNAMATIC
ELECTRO-MAGNETIC

DRAWWORKS BRAKES

Sales and Service Representatives
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EATON

DYNAMATIC DIVISION KENOSHA, WISCONSIN
EATON MANUFACTURING COMPANY, CLEVELAND, OHIO

XUM

Hidden tank farm to keep 50,000 homes warm

Deep in the firs near Puget Sound one of the largest heating oil tank farms in the West is being built... and motorists passing by on the highway will never know it exists.

A large ring of trees has been left standing around the tanks to preserve the scenic beauty of the area; the farm itself will store 28,896,000 gallons of oil...enough to heat 50,000 homes all winter long.

Actually, the six tanks are not needed under normal weather and shipping conditions. They're being built at a cost of more than $1,000,000 to make certain there will be enough oil on hand to meet any emergency spell of unusually bad weather...to make certain the homes of the people we serve always will be warm. Similar expenditures are being made constantly in the important job of serving the West well.

STANDARD
OF CALIFORNIA
plans ahead to serve you better

Standard Oil Company of California

NEW

TUBE-TYPE TOTALLY-ENCLOSED FAN-COOLED

Motors

Maintenance cut sharply on outdoor, corrosive and dirty installations 150 H. P. and up

THE UNIQUE COOLING SYSTEM of the new Allis-Chalmers tube-type, totally-enclosed, fan-cooled motor reduces maintenance to a point never before reached in totally-enclosed motor design. Tubes surround the stator. Internal fans circulate air within the motor to transfer heat to the tubes. An external fan moves outside air through the tubes to remove heat quickly and effectively.

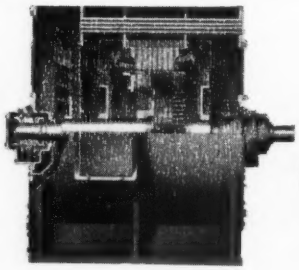
Maintenance Materially Reduced

The new Allis-Chalmers tube-type motor rarely needs cleaning because tubes are straight, the air passages unrestricted, and the cooling air flows at sufficient speed to carry foreign matter out with it. Should unusually dirty air conditions make cleaning desirable, tubes can be swabbed out quickly and easily. This new motor can be installed indoors or out in any atmosphere.

Cooling Efficiency Proved

Three years of successful field operation back up this new motor. For information, on how it can mean lower costs for you, contact your nearest A-C District Office or write for bulletins 51R7149 and 05B7150.

ALLIS-CHALMERS, 1059A SO. 70 ST.
MILWAUKEE, WIS.



HOW TUBE-TYPE COOLING SYSTEM SAVES YOU MONEY ON MAINTENANCE

1. **LARGE HEAT TRANSFER AREA** of tubes plus efficient air flow removes heat quickly.
2. **STRAIGHT TUBES** do not normally clog or collect moisture and foreign matter.
3. **INTERNAL FANS** keep enclosed air constantly circulating, assuring even cooling and fast heat dispersal.
4. **EXTERNAL FAN** blows air through tubes to remove heat quickly and efficiently. Air speed keeps tubes clean.
5. **ALL ELECTRICAL PARTS ARE ENCLOSED:** Dirt cannot enter.

A-C ALLIS-CHALMERS

A 2647

ALLIS-CHALMERS

XUM

when time is money!

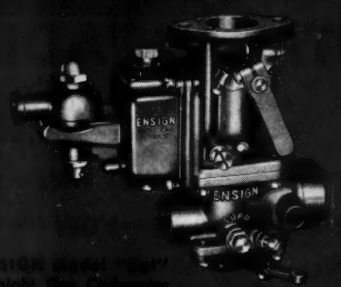
Drillers and production men look to

ENSIGN CARBURETION

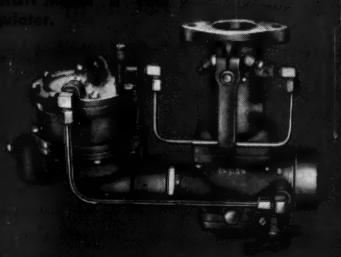
for DEPENDABLE low cost

GAS ENGINE PERFORMANCE

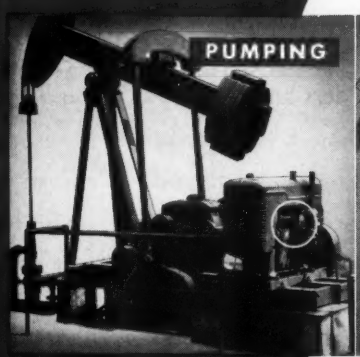
With [illegible] drilling operation boiled down to a split second, there's little excuse nowadays for an unscheduled shut-down due to drilling engine failures. Gas engines provide [illegible] and ECONOMICAL 24 hour service with the [illegible] performance. Good performance depends largely [illegible] operation, which in the case of over 90% of [illegible] is ENSIGN. Over 38 years of carburetor experience are designed into the simple and rugged Ensign models used on todays engines. Operators everywhere have learned to expect gas engines equipped with ENSIGN.

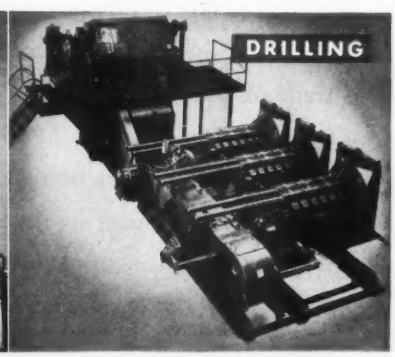


ENSIGN Model "Kgnl" combination Carburetor for use with Natural Gas, Butane-Propane or Gasoline.



ENSIGN Model "Kgl" Straight Gas Carburetor for either Natural Gas or Butane-Propane and ENSIGN Model "S" Fuel Regulator.





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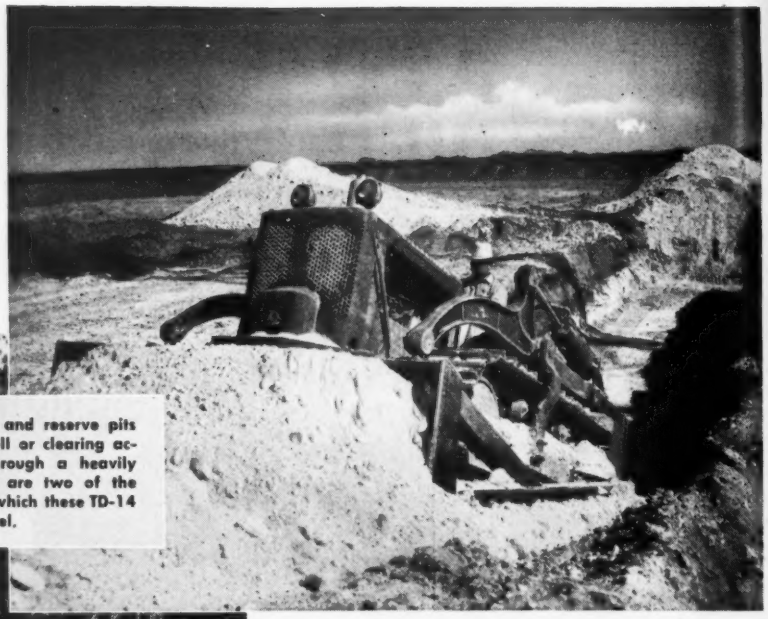

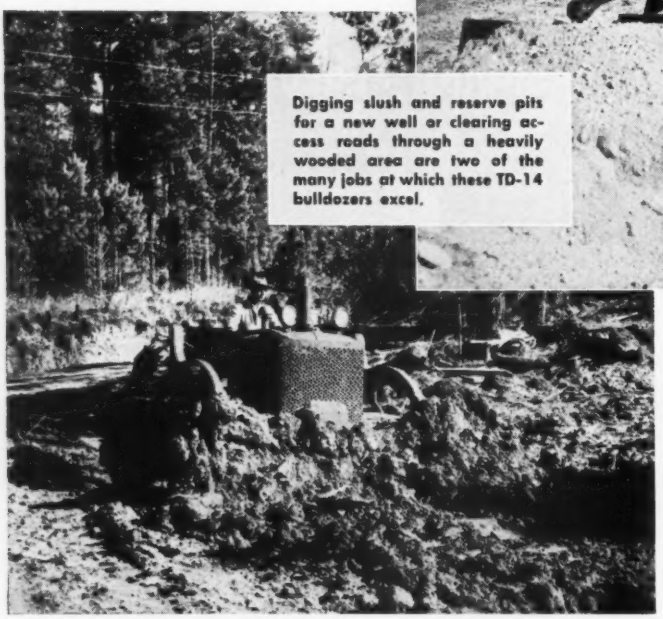

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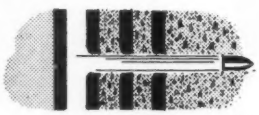
LANE-WELLS GETS  FULL PENETRATION

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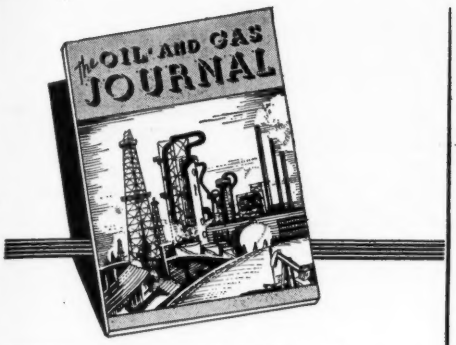

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JOURNALLY Speaking

Going Hollywood

THE usually blase oil industry in these parts is getting itself all worked up over a movie.

Explanation: (1) The name of the picture is "Tulsa"; (2) it's about oil; (3) it will have its world premier in the "Oil Capital of the World" April 13.

The local citizenry and chamber of commerce, quite naturally, are all hepped up over the prospect of entertaining the movie stars and the nation-wide publicity for their fair city which is expected to come from subsequent distribution of the film.

The oil people are getting into the act for the reason that the movie pictures the industry circa 1920, which is all right in itself but a lot of things have happened since then. They want the modern movie-goer to realize that wooden derricks, mule skinners, and shallow gushers are no longer typical.

So the picture's premier will be marked with a mammoth supercolossal extra-special deluxe parade of the very latest of oil-industry equipment including, the advance billing says, everything that can be put on wheels from a geophysical outfit to a fuel-delivery truck.

The producer of the "Tulsa" movie has agreed to film this parade, along with shots of the wild enthusiasm of the opening-night crowds, and use it as a "Coming Attraction" teaser in all theaters where the picture is booked.

The officers of the International Petroleum Exposition and the Petroleum Motor Transport Association grabbed the ball and have stirred up a lot of cooperation among oil and equipment companies for miles around. Last year these two groups staged a parade of $2,000,000 worth of equipment in connection with the oil show, but this year they say they will move $5,000,000 worth past the cameras.

Those who have seen a sneak preview say the movie does a lot better by the oil industry than most Hollywood abortions, and that in spite of the inevitable romance and intrigue it gives a fair picture of the oil industry of a generation ago. The theme on which the plot is built is said to be the struggle to institute conservation measures and scientific production engineering.

If Hollywood can dramatize that theme it's pretty good. Maybe we'll go and see this movie ourself.

Wonders of Chemistry

WE don't like to keep poking fun at the chemists, but often their achievements are so fantastic and their researches so abstruse as to evoke amusement in the lay mind.

For instance, a recent press release from the venerated American Chemical Society describes a recent meeting at which the learned brethren were speculating on tomorrow's chores and one of them pointed out how wasteful and messy it is to shovel coal into a boiler and run a steam engine just to get electricity. All this can be done away with, he said, if some chemical engineer would just take enough time off to invent a device which would generate electricity directly from coal by a chemical process.

After this, the next logical step would be to lower these gadgets down oil wells and get electricity at the well head. This would be a dark day for the pumpers, pipe liners, and refiners, but who are they to stand in the way of the technological progress the chemists say is bound to come?

This same press release, incidentally, related that the chemists are also worrying with the twin problems of how to make a substance harder than a diamond and what use it would be if they should succeed, which would seem to be going a long way to find something to worry about.

Back-Seat Diverters

LEGISLATURES of seven states are considering bills to prohibit the installation of television sets in automobiles unless they are in the back seat. Theory probably is that this will keep the back-seat drivers so absorbed that they'll let the driver alone to give full attention to his driving.

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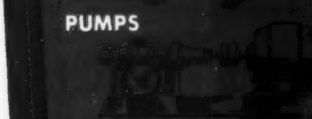
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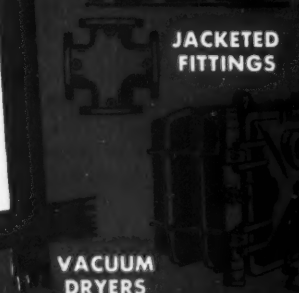
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First Quarter

PAST experience has shown that the outline of a year's oil operations in normal times is well defined at the close of the first quarter. There is still time after the first 90 days to correct any statistical situation that is unhealthy. But past records are clear that time to make these industrial adjustments runs out quickly after April 1.

While Bureau of Mines data will not be available for several weeks, preliminary estimates indicate that up to now the increase in over-all demand for petroleum products has been about half what was expected at the start of the year. The demand at refineries for distillates has been the same as last year with sizable decreases in kerosine and residual fuel. Fortunately gasoline deliveries have been up nearly 10 per cent so that the over-all increase for the four principal products was about 3 per cent.

The higher than normal temperatures in the East and part of the Middle West has been blamed for the disappointing distillate demands in important consuming areas. But the significance of weather in markets can easily be overemphasized. Changes in weather, which not even Washington tries to control, have a tendency to equalize themselves as factors in oil-product requirements. For example the temperatures which reduced fuel needs the past several months aided gasoline consumption.

Refiners as a group have made some adjustments in their plant operations to meet these shifts in demand but obviously not enough. It should be apparent what needs to be done now and throughout the remainder of this year to prevent the inevitable consequences of continued overproduction brought about originally by the desire of operators to assure that the threatened shortages of a year ago would not materialize.

The present increase of 14 million barrels, or 12½ per cent, in gasoline stocks over a year ago will not be excessive, with the greater demands assured, provided seasonal withdrawals start at this time and continue consistently for several months. Fear of shortages during the peak demands of next summer can be ignored in today's operations.

Last year from March 31 to October 31 approximately 50 million barrels of distillate were added to storage. This year as of March 31 distillate stocks are more than 20 million barrels greater than a year ago with gains of 8 million barrels in kerosine and about 25 million barrels in residual fuel oil. Thus the stock situation not only for gasoline but also for all the principal products justifies lower operating levels. In general the same situation applies to lubricating oils.

This problem is not one that can be solved by the state conservation bodies or any other outside agency. The responsibility rests on each refinery operator to get his house in order quickly with the assumption that other divisions of the industry, once they have this refinery yardstick, will adjust their activities accordingly.

Krug Optimistic on Short-Range Oil View But Plugs Synthetics

by Bertram F. Linz

WASHINGTON. — All-out effort to conserve the nation's natural resources and to discover and develop new reserves of oil and other minerals was urged this week by Interior Secretary J. A. Krug in his annual report.

Krug called for "rapid development" of synthetic liquid fuels by private industry with government encouragement; employment of "every available geologist" to speed up discovery of new mineral resources, and restrictions on the use of scarce basic minerals such as copper, lead, and zinc "to protect the economy from the effects of critical shortages."

In the field of energy resources, the secretary declared, "petroleum is our most critical problem." With natural gas, it provides almost half our total energy, and is the key to our national defense. "Nowhere else in the world is there such dependence on oil for economic well-being and national security," he said.

"Yet the petroleum situation is not as dark as it often has been painted," Krug added, pointing out that while our reserves are limited and we have used up a large proportion of our original supplies, there are many undeveloped sources from which we can obtain natural or synthetic oil, including the vast resources found in the Middle East and South America, in the finding and developing of which American oil companies have played a big part.

"It probably would be cheaper in the long run to use some foreign (or imported) oil than to develop some of our own more expensive sources and substitutes," he commented.

"No Assurance of Peace"

"Unfortunately, we have no assurance of continued world peace. So reliance on foreign sources—particularly sources half way around the world—is dangerous. In time of war our demands for oil to power our ships and planes would multiply. Yet we would have great difficulty curtailing the use of oil in our domestic economy. Any wholesale conversion of industrial and domestic users from oil back to coal would be impractical in an emergency. We would find ourselves in a much tighter spot on oil than in the last war."

Krug complained of the lack of adequate statistics on world oil, but said the Bureau of Mines steadily is increasing its coverage.

With respect to the domestic situation, the secretary declared the country is better off than the industry figures of proved reserves of about 21,000,000,000 bbl. indicate, because most experts believe those estimates are conservative and many believe we still have vast unproven reserves, perhaps as much as four times the proven reserves.

But even if this were true, he said, we have only about two generations of domestic crude oil supply left, "a hazardous base upon which to gamble our future."

"True," he admitted, "the nation has experienced scares over its oil supplies for years and we have not yet run out. The fact remains, however, that the best information in the hands of the Government today does not justify complacency. It is time for use to move with the greatest possible speed to develop alternate supplies. It may take us fully 10 years to develop them sufficiently to keep our automobiles, airplanes, and trains moving in a future continuing emergency, not to mention keeping many factories running."

Great Unexplored Areas

There remain great areas of the country that have not yet been explored completely for oil, and no producing region has been so thoroughly explored that new deposits may not be found in it, but the finding of new fields has become increasingly difficult and more costly, he said, and "somewhere in the future there awaits a peak and then the beginning of declining domestic supplies. There is unquestionably an oil-production level beyond which the United States will not be able to go. The change in our oil productive capacity will not be with dramatic suddenness."

Reviewing the current situation, Krug said that most of the additional supply last year came from more intensive development of discovered fields, and additional transportation and refining capacity in this country. Abroad there has been great development in the Eastern Hemisphere.

But, he continued, although major attention is focused on the development of the great sedimentary basins, such as the Persian Gulf, Caribbean, and our own Gulf Coast, "a surprising majority of the nations include within their boundaries sedimentary rocks which offer the possibility of economically producible oil," and those resources should be developed, because "an adequate distribution of oil finding is probably as important as the magnitude of the finding."

The whole domestic petroleum supply situation, however, may be changed if we have reserves of large magnitude along the Continental Shelf, the secretary declared, outlining the steps which have been taken to bring the tideland oil resources under federal control.

"With the end of our present supply of petroleum almost in sight," he asserted, "the nation is extremely fortunate to have these new resources. It would be the height of folly to let this rich heritage be used up on the same basis that has wasted so many of our exhausted assets. Nothing short of the national interest should govern the use of this submerged oil."

Only a "Stop-Gap" Supply

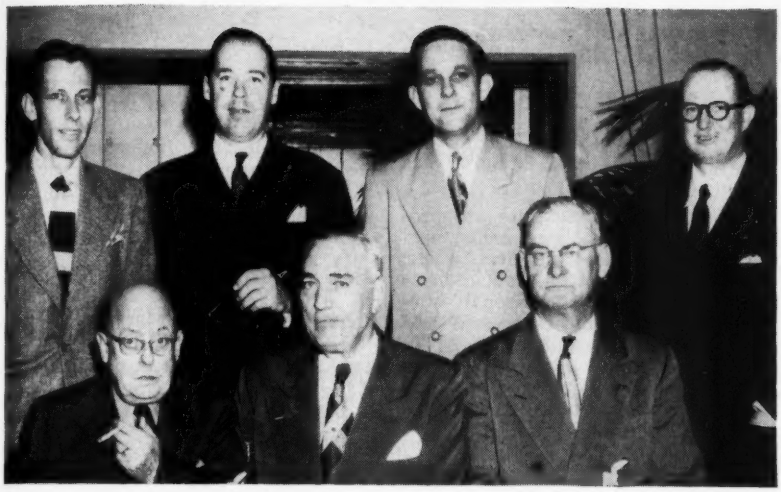
Krug made it clear, however, that he considered the underseas oil only a stop-gap supply and still looks to synthetics as the only permanent solution of the oil problem.

Predicting that as the cost of finding and producing oil increases it will ultimately be cheaper to produce shale oil, he said development of a synthetic liquid fuels industry should be "pushed ahead."

"It may require government financing, although the capital investment for shale oil is estimated at a lower figure than for new petroleum capacity and although private industry is showing increasing interest in it," Krug said. "But regardless of where the money comes from, the nation cannot afford to gamble on its supply of liquid fuel, the chief motive power for war, as well as peace. Rapid development of a synthetic liquid fuels industry will safeguard the future.

"Military authorities estimate that another war would require production of tremendous quantities of oil over and beyond present production. A synthetic-fuel industry capable of producing a substantial amount of oil could not be built during a war emergency if we started from scratch. It would be a long-range development, and department has recommended to Congress that we begin at once to work out the problem of commercial development. Sufficient data have been accumulated by the Bureau of Mines to permit an immediate start which would tremendously speed up expansion in case of an emergency.

"If our foreign supply of oil should be shut off by submarine warfare, or enemy control of foreign oil resources we would face a transportation collapse. A synthetic-oil industry capable of filling this gap could not be built as quickly as our synthetic-rubber industry was built up during the last war unless some commercial production already is under way. We could not convert our millions of oil-consuming homes and industries to coal overnight. Our only safe course is to begin at once the building of a synthetic-fuel industry."



Newly elected officers of the Illinois Oil and Gas Association are shown during the group's annual meeting at Mt. Vernon, Ill., on March 25. In the front row are: T. B. Steele, Kewanee Oil Co., vice president; J. A. Matthews, president; and A. L. Henderson, Ohio Oil Co., second vice president. Back row: John E. Miller, executive secretary; D. M. Rounds, The Texas Co., secretary; Basil Moss, Magnolia Petroleum Co., third vice president; and E. T. Robinson, Smokey Oil Co., treasurer

Illinois Group Hears Schoeppel Attack Dependence on Imports

MEMBERS of the Illinois Oil and Gas Association gathered for their annual meeting at Mount Vernon, Ill., March 25, heard Sen. Andrew F. Schoeppel of Kansas declare that the fullest possible development of our domestic oil resources is essential to the nation's security and economic well-being.

"We should find all the fields we can, develop them fully, produce them under sound conservation practices, and use our oil as we go along," he said. "There is no practical means of financing this necessary discovery and development except by marketing the production which results."

Pointing to the danger of relying on Middle East oil, Senator Schoeppel declared that while costs of producing domestic crude are higher than those for Middle East oil "if we want to maintain our security and our independence of foreign sources of oil, subject to seizure and destruction in time of war and the uncertainties of governmental systems abroad, there is a price to be paid."

Nine Federal Agencies Working on Ideas for National Oil Policy

WASHINGTON.—Nine federal agencies are endeavoring to work out a national oil policy which will cover not only the line to be followed in peacetime but also the mobilization of available friendly oil resources of the world in the event of war, it was learned here this week.

An interdepartmental committee which is wrestling with the subject has before it a number of reports, including three understood to have been written in the National Security Resources Board. These reports are the much-discussed study written last year by Wallace Pratt, then petroleum adviser to the NSRB chairman; another, which never has been made public, by Melvin Sands, Pratt's successor who also shortly is to leave the board; and a third prepared by Col. Gus Vogel, chief of the petroleum division.

Studies are also being made of the National Petroleum Council's report on national oil policy, and other proposals advanced in the past by industry and government sources.

Interested in the matter and reportedly represented in the group which is handling it are the State, Commerce, and Agriculture departments, the Oil and Gas Division of the Interior Department, the NSRB, Armed Services Petroleum Board, Joint Chiefs of Staff, Bureau of Labor Statistics, and Federal Bureau of Supply.

Once developed, the proposals on national oil policy will move "through channels" eventually to reach the White House for final approval, but there is no indication whether they would be sent along to Congress for acceptance or made effective in some other way.

The purpose of the work now going on is to develop the line to be followed with respect to every phase of petroleum, including plans for mobilizing it in the event of an emergency and for the use of oil from other areas at such a time. The studies reportedly also go into the implications of the European Recovery Program, stockpiling against an emergency, and the day-to-day questions of domestic production and conservation, underground resources, refining, synthetics, transportation, imports and exports, and American oil-company operations abroad.

On many of these subjects, divergent views are held in the different departments, and effort is being directed to work up a policy which will represent the thinking of the Government as a whole.

Texas Association Will Hear Hallanan, Thompson

HOUSTON.—Highlighting the third annual convention of the Texas Independent Producers and Royalty Owners Association which will meet April 1-2 at the Shamrock Hotel in Houston, will be addresses by Walter S. Hallanan, chairman of the National Petroleum Council, and Ernest O. Thompson, member of the Texas Railroad Commission.

The address by Hallanan, who also is president of Plymouth Oil Co., is entitled "It's Later Than We Think." Thompson will speak on "The Oil Situation As It Is Today." Another speaker scheduled to address the Texas group, whose membership now totals approximately 4,000, is Kenneth M. Regan, representative from Midland, Tex. He will speak on "The Relationship Between Oil Men and Government, and Other Views of the Workings of Congress."

The association will be among the first organizations to use the convention facilities of the recently completed Shamrock Hotel built by Glen McCarthy, Houston oil operator.

T.I.P.R.O., organized in 1946 to promote the general interest of the Texas independent oil and gas producers and royalty owners, is headed by Guy I. Warren, Corpus Christi. Besides committee meetings and election of new officers, the program includes extensive entertainment.

Oil-Industry Lawyers Discuss Legal Problems of Production

DALLAS.—Many of the oil and gas industry's top legal authorities gathered here March 23-26 to present and hear 16 papers on various phases of oil and gas law and on tax problems at the Southwestern Legal Foundation's first annual Institute on Oil and Gas. In attendance were some 450 lawyers, oil and gas company counsels, and tax experts from states throughout the nation.

Majority of the papers centered around unitization agreements and current tax problems. In addition addresses were given on natural-gas regulations, market-demand statutes, and valuation practices and proceedings. A discussion of the oil and gas laws of the Province of Alberta, Canada, also was given by N. E. Tanner, minister of Alberta's lands and mines department.

Discussing unit agreements and operations, Dean Terrill, vice president and general counsel for Kerr-McGee Oil Industries, Inc., reviewed the legal background of these operations and speculated on their future. He brought out the legal difficulties operators may encounter in unitized operations of oil fields where sale of products is included in the agreement, citing the Cotton Valley antitrust suit as an example. But if operators would confine their agreement to the exploration, development, and production phases only, Terrill felt they would be reasonably safe from antitrust suits.

Unitization Favored

R. M. Williams, attorney for Phillips Petroleum Co., in "The Negotiation and Preparation of Unitization Agreements," was optimistic regarding the future of such projects. The value of unitized operations is no longer questioned, he said, so that the next 8 to 10 years should see them adopted on a much more extensive scale. If the industry does not voluntarily undertake this type of operation, "government agents will do it for us," he added.

A third paper by J. Q. Weatherly of Humble Oil & Refining Co., Houston, dealt with the various types of operating and unitization agreements. Dale E. Flagg of the Bureau of Internal Revenue, Washington, presented the Government's view in regard to unit agreements.

Use of market demand as a factor in controlling oil production is not a reprehensible one of price fixing or stabilization under the guise of waste prevention, R. E. Hardwicke of Fort Worth stated in describing the proration statutes of the various oil-producing states. He presented a number of examples to illustrate why production in excess of reasonable market demand causes physical waste, and why restriction of production so that it will not exceed reasonable demand prevents physical waste and also protects the rights of the producers and royalty owners by giving each producer an opportunity equal with others to produce and market the allowable production.

Criticism of the statutes of the states and the conservation programs, he said, are largely based upon a misunderstanding of the facts or upon unwarranted assumptions as to the purpose and effect of the statutes and programs. This also applies to the criticism of the assistance given by federal agencies in preparing estimates of reasonable consumptive needs, and criticisms of the aid given to the enforcement of orders of state agencies by the Connally Act.

Market Demand Discussed

The program of limiting production to reasonable market demand prevents physical waste and increases ultimate recovery of oil and gas, thereby providing more oil, not less, for trade and commerce, he stated. Conservation and proration may result in price stabilization, he said, adding "for that matter, a state may deliberately and legally exercise its police power by regulating production for economic reasons, including price fixing or stabilization."

"However," Hardwicke pointed out, "the reasonable market demand statutes and the restriction contemplated by such statutes are designed to prevent physical waste and have that effect, whether or not that element is necessary to their validity."

In discussing state and federal regulations of gas utilities, Marshall Newcomb of Lone Star Gas Co., Dallas, brought out the effect of a recent Supreme Court decision in regard to gas transmission. Adopting a "continuous flow" doctrine, the court ruled that sales of natural gas at the well or gathering lines are sales in interstate commerce and are subject to regulations of the Natural Gas Act if the gas so sold is destined for transmission in interstate commerce.

Because of this ruling, he said, producers and gatherers of gas are becoming increasingly reluctant to sell gas to companies who transport and sell in interstate commerce as the sellers do not want to be considered as being engaged in interstate commerce. The Natural Gas Act, he pointed out, does not differentiate sufficiently between the gathering and transmission processes. The Federal Power Commission has ruled that it was not the intent of the law to classify such producers as being engaged in interstate commerce. Thus the Harris bill now in the House interstate and foreign commerce committee is of vital importance as it seeks to accomplish by law what the FPC ruling seeks to accomplish, the speaker added.

Oil Imports in January Continued at High Rate

WASHINGTON.—Importation of crude oil continued at a high rate in January, with 14,683,000 bbl. valued at $32,400,000 entering the United States against 14,062,000 bbl. valued at $33,300,000 in December, it was reported last week by the Department of Commerce. Imports in January 1948 were 8,539,000 bbl. valued at $19,200,000.

Imports of gas oil and fuel oil also showed an increase, amounting to 5,470,000 bbl. valued at $11,400,000 against 5,465,000 bbl. valued at $12,300,000 in December and 5,540,000 bbl. valued at $9,300,000 in January of last year.

In an analysis of the figures, the Independent Petroleum Association of America pointed out that receipts of crude from the Middle East accounted for almost exactly one-third of the January imports, whereas a year ago they were not in the picture at all.

Middle East crude, the I.P.A.A. said, entered this country at the rate of 157,000 bbl. daily in January, 68,000 bbl. coming from Kuwait, 56,000 from Saudi Arabia, 26,000 from Iran, and 7,000 from Iraq. Over the same month, Venezuelan oil entered at the rate of 282,000 bbl. daily, while receipts from Colombia were 27,000 and from Mexico 8,000 bbl. daily.

All of the residual fuel-oil imports, 165,000 bbl. daily, were from the Netherlands West Indies. Imports of distillate fuel oil averaged only 4,000 bbl. daily and other refined products 3,000 bbl. daily, with no breakdown by country of origin because of the small volume.

Total imports of crude and refined products averaged 646,000 bbl. daily, of which 583,000 bbl. was for consumption and 63,000 bbl. free of duty for use in vessels.

Bill to Tax Natural Gas Shelved in Texas House

AUSTIN.—A bill calling for a tax of 1.5 cents per 1,000 cu. ft. of natural gas may in effect have died last week in the Texas House of Representatives when the bill was sent to what was considered an "unfriendly subcommittee."

The house revenue and taxation committee refused to send Rep. Deno A. Tufares' bill to the committee on highways and roads.

this week

OUTLOOK—Current condition of ample supplies not viewed with alarm by industry leaders. . . . Public statements call it safeguard against emergency events and threat of political interference. . . . Also seen as challenge to industry to maintain sound operations. . . . ¶Secretary of Interior now believes domestic industry in good shape for near future but worries over next generation. . . .

PLANNING—Refiners studying first-quarter results as key to stock changes and yield pattern for balance of year. . . . ¶Discussions at technical meetings have strong economic flavor, showing keen interest of entire industry in economic trends and company policy. . . . ¶Washington showing great interest in national oil policy. . . . Nine federal agencies are working on oil plans and congressional committee is starting a study. . . .

IMPORTS—Official figures show imports continued at high rate in January. . . . ¶Kansas senator criticizes dependence on distant oil sources. . . . Says U. S. should pay the price of higher-cost domestic reserve capacity. . . . ¶Conoco president says imports need not be a threat if wisely controlled by industry itself. . . .

PRODUCTION—Texas commissioner gives warning of more stringent conservation rules to come. . . . Hints secondary-recovery methods may be applied to new fields. . . . Might prevent use of some gas for pipe lines. . . . ¶Better recovery methods predominate at producers' meetings. . . . Speakers urge more conservation and building up excess capacity. . . . ¶More unitization and stronger conservation laws are discussed. . . .

TRENDS—Operators have drilled about 500 more wells in the first 12 weeks of this year than in same period last year. . . . ¶Daily average crude-oil production in U. S. from the first of year through March 26 was 0.4 per cent less than same period last year. . . . ¶Indicated crude-oil imports (A.P.I. foreign runs and Bureau of Mines foreign stock) for 3-week period ended March 19 averaged 335,000 bbl. daily compared with 448,000 bbl. daily, reported for January by Bureau of Mines. . . . ¶Markets for the week were highlighted by increasing firmness in gasoline prices and declines in fuel postings. . . .

INTERNATIONAL—Foreign crude output dropped 65,000 bbl. daily in January. . . . Venezuela, down 8.5 per cent, chiefly responsible. . . . Middle East output still climbing but at lower rate. . . . ¶Alberta production may be cut back awaiting pipe-line outlets, but exploration will continue at high rate. . . . ¶Brazil warned it must admit foreign capital for oil development or surrender its economic program. . . . ¶Italy finds new gas field which may also yield some oil. . . . ¶More details of new Mexican contract revealed. . . . ¶Haifa refinery may be put back in operation soon.

PIPE LINES—El Paso Natural proposes to lay 451-mile pipe line from northwestern New Mexico to Arizona-California border which was originally proposed by San Juan Pipe Line Co. . . . ¶Line acquired from RFC by Shell Oil Co., Inc., enlarged and put into service. . . . ¶FPC orders oral arguments April 4 on East Tennessee proposal to construct natural-gas facilities to supply Atomic Energy Commission's Oak Ridge plant. . . . ¶ICC figures indicate traffic of oil pipe lines gained 9.8 per cent in 1948. . . . ¶Complete table shown for 1949 pipeline construction, including projects to be contracted soon. . . .

REFINING—Skelly Oil Co. enlarging, modernizing Eldorado, Kans., refinery at cost of $8,000,000 to $10,000,000. . . . ¶Diesel engine runs on mixture of pulverized coal and oil. . . . ¶Newly bought refinery for Italy will be revamped to step up production from 7,500 to 10,000 bbl. daily. . . . ¶Ashland Oil & Refining opens new Ohio River terminal at Evansville, Ind. . . . ¶Bureau of Mines official says progress being made in getting cheap gasoline from coal. . . .

The fight to snuff out the Shell Oil Co., Inc., offshore well fire in the Gulf of Mexico near Pass a Loutre continues. The fire has been blazing since March 12. Company estimates rig and platform damage at approximately $750,000. An emergency rig is being readied to drill a directional hole to stop the flow of gas

More Production Rules Coming, Murray Warns Texas Oil Group

by D. H. Stormont

WICHITA FALLS.—The Texas Railroad Commission may employ its waste-prevention powers in an effort to bring about more widespread application of secondary-recovery projects with their attendant higher oil yields, it was indicated here March 26 by Chairman William J. Murray.

Speaking before some 300 independent oil operators and company officials and engineers in a secondary-recovery session of the annual meeting of the North Texas Oil and Gas Association, Murray said the commission had long been aware that the value of gas being flared was insignificant in comparison to the wastage of oil underground. Because of the oil shortage during recent years, however, emphasis has been placed on meeting market demand rather than on obtaining the maximum recoveries offered by secondary-recovery operations. Now that Texas fields are no longer pressed to meet market demand for oil, he believes steps should be taken toward increasing the ultimate oil recovery.

From the viewpoint of an observer and not as a commission member, he reviewed the recent court decisions involving gas flaring in Selligson, Heyser, and Flour Bluff fields. The language used in these decisions, upholding the commission's rulings, seemed to him to give the commission power to bring about the recovery of the last possible barrel of oil from any field, and further, that it was the commission's duty to seek the maximum oil recoveries made possible by use of secondary-recovery methods, Murray said. He defined these as methods applied at any time in a field's life which result in a higher oil yield than would be obtained by primary methods.

Progress Reviewed

He reviewed the progress being made in the commission's drive to eliminate flaring casing-head gas, pointing out that one of the largest flares in Texas (in Goldsmith field of West Texas) had been checked last week. Increasing oil recoveries, however, is much more important than elimination of flaring, he said. Thus while sale of gas to pipe lines does away with gas wastage, he would like to see this gas returned to the producing reservoir.

Commissioner Murray then called attention to the MER hearings beginning next month. He stated operators would be required to submit evidence backing up their opinions as to the maximum efficient rate for a given field. Data as to anticipated ultimate recoveries also would be asked for, he stated, adding that if poor recoveries were being obtained the field's operators would be asked what they intend to do toward improving the yield.

To many of the engineers in attendance, Murray's address was similar to the commission's first warning, some 3 years ago, as to its intent to stop flaring of casing-head gas. His address they feel may thus have been the opening gun in a drive to require the adoption of secondary-recovery operations in all fields where it can be proven that underground "waste" of oil is taking place because of failure to use such methods. Thus the day may come, they reason, when operators will not be permitted to sell their gas to transmission lines if it can be shown that reinjection of this gas to the producing horizon will result in more oil being produced.

Conservation Defended

A defense of conservation practices was also made by another featured speaker at the convention, L. F. McCollum, president of Continental Oil Co. He praised the North Texas operators for their conservation measures and urged them to go even further, saying that conservation is one of the forces which will keep the industry stable and will increase domestic supplies for an expanding market and for an emergency.

"Secondary recovery is a means of increasing production—and conservation it is, when we realize that it increases the amount of a natural resource made available," he said. "Cooperative secondary-recovery measures, legalized by statute if necessary, serve the public interest.

"Both above and below the ground, in our oil fields, we must do everything we can economically to bring every barrel of oil to the surface—or to hold it safely and securely in storage until the proper time for its use.

"Intelligent conservation laws must be observed, and new ones adopted if found necessary. Excessive above-ground flaring of gas and other practices that prevent our getting maximum recovery from every well that we discover must be stopped. It costs a lot more to find oil today than it did 10 years ago, so when we find an oil well we've got to get all of its oil we can into storage, into refineries, and to the consumer."

Following McCollum's address, Walter S. Hallanan, president of Plymouth Oil Co. and chairman of the National Petroleum Council, spoke on "Oil and Socialism Don't Mix." In discussing the tidelands case, he declared that the doctrine of "paramount rights" of the federal Government in certain essential materials, as laid down by the Supreme Court in the California tidelands case, could be extended to include oil beneath inland property.

"It cannot be contended logically," he pointed out, "that tidelands oil possesses any specific properties that make it more essential to national defense than oil beneath the uplands."

George W. Dimock, retiring president of the association, presided at the banquet session at which the new officers were installed prior to the speeches. These new officers are R. Clay Underwood, president; Marvin E. McCullough, first vice president; and Charles E. Prothro, second vice president. Fred Sehmann was reelected executive vice president. All reside in Wichita Falls.

Discuss Taxes, Insurance

During the day, general and secondary-recovery sessions were held in the morning and afternoon. The general sessions were devoted largely to hearing addresses on taxes and insurance problems. In the secondary-recovery sessions, case histories were given on several North Texas fields. Other papers centered largely around equipment for studying and testing oil reservoirs, and for increasing the productivity of wells.

In "The Tax Outlook for the State of Texas," Charles E. Simons, executive vice president of the Texas Mid-Continent Oil and Gas Association, dealt chiefly with the three tax bills which have been introduced at this session of the Texas Legislature to levy taxes for the rural-roads program. Regarding the proposed 1 cent per gallon processing tax on the manufacture of combustible condensates, he pointed out that refineries could not absorb this levy as it would amount to as much as 10 per cent of the total selling price of their gasoline and as much as 25 to 50 per cent of the selling price of such products as butane and propane.

"From the oil producer's own personal welfare, this measure should be considered from the standpoint that it amounts to 22 cents per barrel of a processed barrel of crude. If this is passed back to the producer the total is equivalent to some 33 cents per barrel tax, since he is already paying 11 cents per barrel production tax. Such a measure is a threat to the industrialization of Texas since this type of tax would be in direct conflict with one of the principal reasons that industries have for moving to Texas: favorable tax structure."

Other addresses given in the morning session were: "Tax Outlook for

Counties and Schools," by H. C. Marsh of Phillips Petroleum Co., Amarillo; and "Federal Tax Decisions Affecting the Petroleum Industry," by T. H. Marshall, vice president of Anderson - Prichard Oil Corp., Oklahoma City. In the afternoon session Col. Dwight Horton of the Texas Employment Commission spoke on the Texas Unemployment Compensation Act; J. H. Johnson of Continental Oil Co., Ponca City, gave an address on insurance problems; and Dr. Carl C. Rister of University of Oklahoma discussed his new book, "Gold or Oil."

Resumes of repressuring operations in Red River field, by K. M. Johnston of the Bureau of Mines, Bartlesville; in K.M.A. field, by E. K. Schluntz of Shell Oil Co., Inc., Tulsa; and in Larimore field, by M. A. Remke of Phillips Petroleum Co., Oklahoma City, were presented during the two technical sessions. *(Johnston's paper will be printed in full in April 7 issue of The Oil and Gas Journal).*

In Larimore field, Remke brought out, the Larimore sand in which repressuring operations are being conducted has been unusually prolific. As of the first of this year the 200-acre field had produced 2,458,000 bbl. of oil, representing 56.6 per cent of the total volumetrically calculated stock-tank oil in place. Of this total production, 1,521,000 bbl. had been produced by primary methods and gas injection had resulted in the production of the additional 927,000 bbl. The operations are being conducted in a 16-ft. sand found at 700 ft. deep. The field was discovered in 1930 and gas injection operations were started early in 1931.

In the morning session, at which Walter C. Krog, petroleum engineer for W. H. Hammon, Wichita Falls, presided, Kirby C. Gee of Schlumberger Well Surveying Corp., Wichita Falls, discussed electric well logging and how the logs are interpreted. J. L. Wiley of McCullough Tool Co., Houston, discussed use of the Magnatector in pulling casing; and C. C. Olson, of Halliburton Oil Well Cementing Co., Duncan, Okla., described the use and interpretation of drill-stem tests and bottom-hole pressure tests. In the afternoon session in addition to the papers of Remke, Commissioner Murray, and Schluntz, J. B. Clark of Stanolind Oil & Gas Co., Tulsa, discussed the "Hydrafrac Process for Increasing the Productivity of Wells."

McCollum Cites Factors Making Oil Industry Stay Dynamic and Stable

WICHITA FALLS. — The way in which the oil industry licked last year's shortages proves that it is a dynamic industry, and the same forces can keep it dynamic and also stable, L. F. McCollum, president of Continental Oil Co., told the banquet meeting of the North Texas Oil and Gas Association here March 26.

"The record demonstrates that a dynamic industry, spurred by prices, offered a reward of a fair profit, can perform what I sincerely describe as miracles," he said.

"A year ago we pleaded that the problem of short supply be left to free enterprise. We asked that the dead hand of government be withheld. We foretold that the full force of demand would result in adequate supply. Our plea was heeded and our performance was superb.

"In the last 2 years the domestic oil industry has expanded by one-fifth. Four million dollars have been invested in new oil wells, in new transportation facilities, in expended refining capacity, in new and better marketing facilities.

"Some say that we have overshot our goal. In so far as the market for tomorrow, March 27, is concerned, that may appear to be true. But for the tomorrow that is 1, 2, or 5 years ahead, I don't think it is true."

McCollum pointed out that allowables have now been cut back 800,000 bbl. per day and another 100,000 bbl. per day is shut in in such states as California, Wyoming, Montana, Pennsylvania, and Mississippi, making a total of 900,000 bbl. per day excess capacity.

"That, by itself," he said, "is 45 per cent of the amount that the politicians and calamity howlers were saying we need as a 'cushion' for possible emergencies. Such self-appointed experts have proposed taking $9,000,000,000 from the pockets of the taxpayers. They propose to spend that, and more money, over something like 10 years, to give our nation a 2,000,000-bbl.-a-day 'reserve capacity' from sources other than crude oil."

He referred to the government proposal to construct commercial - size synthetic-fuels plants, and said that the Interior Department is still advocating this, but declared "if we can do 45 per cent of the job we can do the rest of it."

"Despite our demonstrated ability," he continued, "our competitive, capitalistic system is still subject to attack. We must forge ahead. We must build ourselves a reasonable margin of capacity to produce—whether it be one, two, or more million barrels a day—in excess of today's demand."

Forces which will keep the industry stable in the future, McCollum said, are increasing demand, conservation, imports, and price.

"More people using more petroleum products, making for us an expanding market, helps assure a stable oil industry. And there's no end in sight to an increasing demand for oil." He pointed to the increases in number of automobiles, oil burners, farm mechanization, dieselization of railroads and industry, and installations for liquefied petroleum gas, as spelling a steadily expanding market.

Imports Should Supplement

"Still another force, and within our own industry, that influences its stability, is the importing of oil," the Conoco president said. "Imports of oil should continue so long as they supplement and do not replace or displace domestic production. I stand foursquare behind the policy as outlined by the National Petroleum Council on imports. Imports can be, imports are, a factor in making and keeping our industry a stable one. We must be realistic about imports, just as we are about conservation, and see to it that imports serve, not swamp us.

"And, finally, there is a fourth factor which will make our industry stable. And over this factor we have no control. This factor is price. In our free and capitalistic economy the laws of supply and demand are immutable. One company can't change them. Nor can one industry, nor even a group of industries. Even our government, equipped with its wartime powers and operating rigid price controls enforceable by prison sentences, found it could not change the laws of supply and demand. Prices were set in the black markets.

"These factors that I have discussed," he concluded, "will bring about stability. I don't think that any one of them, alone, can keep our industry stable. More likely two or more, exerting varying degrees of influence, will be the stabilizing forces. But, if we overproduce at the source, if we fail to practice proper conservation, if imports are permitted to flood us, then we can look for stabilization to come from the economic forces of supply and demand."

Wyoming Landmen's Group Formed; Meetings at Casper

Wyoming Landmen's Association has been formed, and meetings will be held weekly at the Gladstone Hotel in Casper, according to Frank P. Castleberry, Atlantic Refining Co., president.

Other officers of the 46-member group, made up of landmen from 21 companies, include: H. E. Thompson, Amerada Petroleum Corp., and Hal Thompson, British American Oil Producing Co., vice presidents; Tom Hunt, H. L. Hunt Oil Co., secretary, and Art Culver, Argo Oil Co., treasurer.

International

WORLD-WIDE OIL DEVELOPMENTS

Pauley Reveals More Details Of Drilling Deal With Pemex

WASHINGTON.—Further details of the contract recently concluded by the Mexican American Independent Co. and Petroleos Mexicanos were disclosed here last week by Edwin W. Pauley, California oil man who, with Ralph K. Davies, president of the American Independent Oil Co., and Samuel B. Mosher, president of Signal Oil & Gas Co., negotiated the agreement.

Pauley revealed that in addition to the states of Tabasco and Veracruz, previously announced, the group also will operate in Campache, placing the total area involved at "several million acres," which will include three structures in the uplands and lagoons and seven in the Gulf of Mexico, which he said is readily workable to a distance of some 10 miles from shore.

The group is required by the agreement to post a $1,000,000 guaranty bond and to make advance deposits on its estimates of expenditures, which already run to "several million" dollars. The period of development, while 12 years for the upland structures, runs 15 years in the tidelands.

Pauley said that the three parties in the agreement have equal interests and Mexican Independent will be an operating entity rather than a company formed to handle the whole deal. Costs will be contributed equally by the three groups and the returns from the venture will be divided the same way.

Under the contract, C.I.M.A. (abbreviation of Mexican Independent's name in Spanish) is to handle the exploration and development work and, in the event oil is found, has an option to build pipe lines or other facilities necessary to transport the oil, at the expense of Pemex, which is responsible for transportation and would operate the facilities. C.I.M.A. also is to provide, again at Pemex's expense, technical advice on production along lines of proper operation of wells, gas-oil ratios and rates of flow.

Pauley explained that the company will be reimbursed for its expenses and compensated for its work (at the rate of 50 per cent of production for the former and, for the latter, 15 per cent on upland production, 16¼ per cent from lagoons, and 18¼ per cent from submerged lands) in oil at a price based on the field price for comparable oil in Oklahoma, inland Texas, and New Mexico, and the oil will be carried to seaboard by Pemex without expense to the company. All payments are to be free of Mexican taxes.

In addition, C.I.M.A. has an option to buy Pemex's share of the production from the fields it brings in at prices similarly arrived at, for export.

Pauley disclosed that the agreement was negotiated only after close study of the work done in the area by E. DeGolyer and Pemex's own staffs, and that for more than 18 months Signal Oil & Gas Co. had a vessel in the Gulf exploring the underwater area.

No Operations Restrictions

There are no provisions in the contract which will in any way restrict the freedom of the group to conduct operations as it sees fit, Pauley said. Once a field is discoverd, it will be up to C.I.M.A. to determine how many wells are necessary for its proper exploitation, their location, and depth.

Each structure is to stand as an entity; if the first wells drilled are dry but a hit is made elsewhere on the structure, the company will be compensated for all its drilling costs, but if exhaustive efforts fail of success the company loses out.

A tremendous amount of detail was involved in the negotiations to fix the limits within which C.I.M.A. could operate legally under the Mexican laws, Pauley said. He declined to comment on the possibility that if Mexico gets a government loan from this country it might discourage other similar contracts, explaining that he has not been involved in the effort now being made by Antonio J. Bermudez, general manager of Pemex, to secure United States financial assistance.

Haifa Refinery Released By Israeli Government

THE Haifa, Palestine, refinery of Consolidated Refineries, Ltd. (Anglo-Iranian and Shell), has been officially handed over to the British management by the Israeli Government.

The 83,000-bbl. daily capacity plant has been shut down since late last spring as a result of the Jewish-Arab fighting and closing of the pipe line from Kirkuk field in Iraq. A report from Haifa said it is expected that the refinery will be reopened at the beginning of May, about a month earlier than originally planned.

The staff of 300 which has maintained and operated the refinery in the interim is expected to be expanded to about 2,000 with resumption of operations. A Lloyd's agent inspected the properties for renewal of insurance, and a thorough overhaul was said to be planned.

The Haifa report made no mention of a source of crude oil for the refinery. Discussions at government levels have been under way on resumption of operation of the Iraq pipe line.

U.N. Resources Group Meets

Dates for the United Nations Scientific Conference on the Conservation and Utilization of Resources have been fixed as August 17 to September 6. The conference will be held at U.N. Interim Headquarters at Lake Success, N. Y.

Several sessions dealing with petroleum reserves and operations are included among the subjects to be discussed. The conference is being arranged by the U.N. Economic and Social Council *(The Oil and Gas Journal, February 24, page 103).*

Foreign Crude Output Dropped 65,000 Bbl. Daily in January

CRUDE-OIL production outside the United States dropped back some 65,000 bbl. daily in January as a result of reductions in Venezuela's output which accounts for nearly 40 per cent of the foreign total.

Indicated production outside the United States in January approximated 3,306,300 bbl. daily as compared to 3,371,400 bbl. daily in December. These figures exclude Russia and Eastern Europe which are believed to be producing about 724,000 bbl. daily. Aggregate foreign production thus totaled about 4,030,000 bbl. daily in the first month of this year.

Middle East production in January gained, but not at the same sharp rate which has been characteristic of this area. The total was 1,352,500 bbl. daily, an increase of 44,600 bbl. daily over December.

The gain in Middle East production, together with increases in various smaller producing countries, were overbalanced by the cutbacks in Venezuela. This largest foreign producing country showed a production decline of 116,500 bbl. daily from December to 1,246,000 bbl. daily in January. This represents a decrease of about 8.5 per cent.

Venezuelan Cut Explained

Cutbacks on the part of the producing companies because of the weak market for heavy fuel oil, and secondarily a labor strike, were responsible for the drop in Venezuelan output. Creole Petroleum Corp., which accounted for most of the reduction, has explained that demand for heavy fuel oil was considerably lower last winter, and previous operations at maximum efficient levels resulted in storage at full capacity, necessitating the cutbacks.

Elsewhere in the Western Hemisphere, production was little changed in January. Canadian output continued to rise and was estimated at about 44,000 bbl. daily for the month. Official government figures for December show 40,200 bbl. daily. Of this 38,800 bbl. daily was in Alberta which is receiving probably the greatest oil play of any single area since the end of the war. Leduc field, discovered less than 2 years ago, produced a daily average of 21,400 bbl. in January, which approximately equals the daily average of all of Canada in 1947.

Europe and Africa together in January produced some 67,000 bbl. daily, an estimated 40,000 bbl. of which came from Egypt. Netherlands' Schoonebeck field continued at 11,400 bbl. daily. This field, now the largest in Western Europe, is now considered about at its maximum efficient level of withdrawals.

Of interest in the Middle East was the fact that production in Kuwait, where Kuwait Oil Co., Ltd. (Anglo-Iranian and Gulf) is the operator, showed a reduction of about 800 bbl. daily in January. Output was 210,600 bbl. daily against 211,400 bbl. daily in December. Iranian production on a daily average basis fell back to about 534,000 bbl. daily. All the increase in the Middle East was in Saudi Arabia where production rose to 523,900 bbl. daily from the 466,400-bbl. daily output in December. Arabian American Oil Co.'s production through most of this year is expected to remain at around 525,000 bbl. daily.

In the Far East continued increases in production were shown by Indonesia and British Borneo. In the latter area, Royal Dutch-Shell affiliates are producing more than 60,000 bbl. daily from Seria field in Brunei.

WORLD CRUDE-OIL PRODUCTION
(In thousands of barrels daily)

Country—	January 1949*	Previous month
Western Hehisphere:		
Argentina	70.6	69.2
Bolivia	1.9	1.9
Brazil	0.4	0.4
Canada	44.0	40.2
Colombia	82.5	82.5
Cuba	0.3	0.3
Ecuador	7.1	6.0
Mexico	158.1	160.6
Peru	40.1	41.1
Trinidad	55.0	54.8
Venezuela	1,246.0	1,362.5
Total	1,706.0	1,819.5
Europe and Africa:		
France	1.0	0.9
French Morocco	0.4	0.3
Germany (W. Zone)	13.4	13.5
Italy	0.2	0.2
Netherlands	11.4	11.4
Egypt	40.0	38.9
United Kingdom	0.9	0.9
Total	67.3	66.1
Middle East:		
Bahrein	30.5	30.0
Iran	534.0	547.0
Iraq	53.5	53.1
Kuwait	210.6	211.4
Saudi Arabia	523.9	466.4
Total	1,352.5	1,307.9
Far East:		
British Borneo	63.0	62.0
Burma	0.5	0.6
China	1.8	1.8
India	5.3	5.1
Indonesia	102.0	100.0
Japan	2.7	3.2
New Guinea	4.0	4.0
Pakistan	1.2	1.2
Total	180.5	177.9
Total foreign less Russia and E. Europe	3,306.3	3,371.4
Russia and E. Europe:		
Albania	1.0	1.0
Austria	17.0	17.4
Czechoslovakia	0.9	0.9
Hungary	9.3	9.3
Poland	2.6	2.6
Romania	80.0	80.0
Russia	612.0	612.0
Yugoslavia	1.1	1.1
Total	723.9	724.3
Total foreign	4,030.2	4,095.7

*January figures from official company or government reports or reliable private information. In some cases previous month's figure has been carried forward in the absence of information indicating a change. Figures for Russia and Eastern Europe are estimates.

VENEZUELAN PRODUCTION BY COMPANIES, JANUARY 1949
(Figures in barrels daily to nearest hundred)

Creole Petroleum Corp.	578,100
Royal Dutch-Shell:	
Venezuelan Oil Concessions, Ltd.	296,400
Colon Development Co., Ltd.	11,000
Shell Caribbean Petroleum Co.	81,800
Total	389,200
Mene Grande Oil Co., C.A.	177,000
British Controlled Oilfields, Ltd.	10,900
Sinclair Oil & Refining Co.	17,700
Venezuelan Atlantic Refining Co.	10,200
Socony-Vacuum Oil of Venezuela	32,100
Texas Petroleum Co.	20,900
S.A. Petrolera Las Mercedes	15,200
Phillips Oil Co.	1,900
Richmond Exploration Co.	1,800

The above figures, as well as those in the table of production by fields below, are from Venezuelan Government reports. The table of production by companies includes production taken from properties held in the name of the particular company, and in some cases includes oil shared with others. The data do not agree with company reports which show production by properties operated by the particular company. Creole Petroleum Corp.'s January report, for example, shows a daily average of 516,580 bbl. operated production.

VENEZUELAN PRODUCTION BY PRINCIPAL FIELDS, JANUARY 1949
(Figures in barrels daily to nearest hundred)

Cabimas	66,100
Tia Juana	121,500
Lagunillas	328,500
Bachaquero	80,400
Mene Grande	46,300
La Paz	114,500
Mara	68,000
El Cubo	11,000
Quiriquire	50,200
Jusepin	36,400
Mulata	19,100
Santa Barbara	25,000
Temblador	10,400
Oficina	44,800
Guara	76,800
Nipa	30,300
San Joaquin	10,600
Guico	14,800
Las Mercedes	15,200

Brazil Must Develop Oil Land or Halt Growth, Commission Warns

WASHINGTON.—Brazil must either open its doors to foreign oil capital or abandon its present program for expansion of air and highway facilities, it is warned by the joint United States-Brazil Technical Commission which has been studying the possibilities for industrial and other development in that country.

The commission's conclusion was voiced in its full report to the two governments, released here last week by the State Department following publication of a summary of the group's findings. The subcommittee reports on which those findings were based have not yet been made public.

"The extraordinary development which is occurring in Brazil in respect of air and road transportation as well as in industry is the best proof that an imperative necessity exists to explore petroleum in the national territory, with the maximum urgency," the commission said.

But beyond this, it was explained, the need for oil development is amply demonstrated by consideration of the relief it would bring to Brazil's present balance-of-payment difficulties, and Brazilian officials also "must be concerned as to the continued availability of petroleum from abroad in case of another international emergency, because it is already quite clear that in such an event military needs will require even more stringent restrictions on civilian uses than prevailed during the recent war."

Imports Restricted

"The present possibilities of Brazil's exports and the country's resistance to import restrictions would appear to indicate that Brazil will be able only with difficulty to maintain the volume of foreign petroleum purchases needed for the expansion indicated," it added.

Under the SALTE plan developed by the Brazilian Government last year (the name is derived from the first letters of the Spanish equivalents for health, food, transportation, and energy) an expenditure of $135,000,000 for oil development over a 4 or 5-year period was outlined, of which $118,000,000 would be in foreign currencies. The major part of this expenditure, however, was to be for refineries, and only $62,000,000 was proposed for exploration, including the drilling of experimental wells.

"Up to now the Brazilian Government has been exclusively burdened with all the charges connected with exploration," the commission said. "However, the government is not in a position, nor could it be, to obtain sufficient resources for an intensive exploration plan in the vast areas where there is every indication that petroleum exists. The resources foreseen in the SALTE plan are limited for such an undertaking, although considerably larger than those secured up to now.

"The exploration work now under execution, amplified by the SALTE plan, may bring about satisfactory results at an early date. But it should not be overlooked that these surveys may prove fruitless, in spite of the skilled knowledge of the technicians who are engaged in the job. This is due to the fact that success in petroleum exploration work, despite the high standard of perfection in the methods adopted, is always uncertain.

"Consequently, the best method to attain immediate possible results is, unquestionably, to intensify the exploration work."

Gas Well Completed In Upper Po Valley

ANOTHER good gas field prospect together with high-gravity oil in apparently small quantities has been discovered by Azienda Gerenale Italiana Petroli in its Cortemaggiore 2 about 22 km. east of Piacenza in the Upper Po Valley of Italy.

The well was recently completed from 1,533-40 m. (around 5,050 ft.) with a closed-in pressure of 2,206 psi. Its initial flow through a 4-mm. choke was not gaged but the well produced a large quantity of gas together with condensate estimated at 1 bbl. an hour.

Cortemaggiore 1 is still drilling. This well, begun in April 1948, tested small gas shows in the Quarternary at 560 and at 970 m. The original hole was taken to 1,650 m. and sidetracked at 1,200 m. A drill-stem test in December at 1,585-1,610 m. resulted in about 70 m. of oil and salt water in the pipe.

The drilling resulted from seismograph work by AGIP. The structure also is about 20 km. south of Cremona. Several other gas fields are producing in this general part of the Po Plain, but none in the immediate vicinity. AGIP also is drilling another gas discovery at Ripalta, 7 km. northeast of Lodi field. The first well blew out early last year. The structure of some 30 km. is considered promising.

Soc. Petrolifera Italiana (Standard Oil Co. of New Jersey), has one rig running in the eastern part of the Po Valley. A recent report from Rome said an important deposit of gas had been found at Montalbano, 13 km. from Ferrare. Production was placed at 25,000 cu. m. daily (about 880,000 cu. ft.).

Extensive exploration in northern Italy is expected to get under way once the Italian Government approves the revisions in its mining regulations. Action on this has been awaited for some time. At present companies are held to small concession blocks which discourage activity. Italy at present produces considerable gas but only a few hundred barrels of oil daily. Some geologists feel deeper drilling may uncover more substantial oil formations.

Shell of Australia Will Build 2,000 Bbl. Refinery

Work on dock facilities is now under way at Geelong, Victoria, Australia, preparatory to the construction of a new 2,000-bbl. daily refinery by Shell Oil Co. of Australia.

The plant will be located at Corio Bay, about 45 miles southwest of Melbourne, a site chosen for its advantages in the receipt of crude oil and the distribution of products. E. N. Avery, general manager of Shell of Australia, said the project involves a capital expenditure equivalent to more than $5,000,000, including the cost of the 250-acre site.

The refinery, to be operating in 1951, is designed as a self-contained unit, and its initial feed stock is expected to be sterling crude oil from Venezuela. The plant will serve especially Victoria's growing demand for asphalts and lubricants. All grades of bitumen will be produced, and a modern lubricating-oil plant will be built. At present, nearly all of Australia's requirements for lubricants are imported.

French Refineries Meet Goal

The French petroleum refining industry processed 905,322 tons (about 205,000 bbl. daily) in January compared to 956,356 tons in December. Even the lower January rate represents a 10,900,000-ton annual rate, greater than the 10,000,000-ton annual rate the French originally set as a 1951 goal. Total January receipts of crude oil by French refineries were 993,152 tons (about 224,000 bbl. daily).

Alberta Production May Be Cut Until Pipe Line Can Be Built

ALBERTA oil production is rising at such a rate that temporary curbs may be necessary until the construction of suitable pipe-line outlets allows the crude to compete economically in other markets, J. R. White, vice president of Imperial Oil, Ltd., said March 23 in a talk at London, Ont.

In a discussion of "Canada's New Oil Industry," White said Alberta production probably will exceed refining capacity by the middle of 1949. He pointed out that measures to avoid excessive output already have been suggested in the Alberta Legislature by the minister of mines and lands.

"We all know that Alberta is isolated by walls of distance and correspondingly high freight rates from the more densely populated centers of the continent," he said. "Nor is Alberta close to the sea or to the large natural waterways which have been the economic salvation of many another distant oil field.

"That means that if Alberta crude were to be shipped to these markets under present conditions, it would have to bear very high shipping charges and there would be little left for the producer."

Exploration to Continue

Regardless of what happens in the way of price changes or temporarily restricted output, it is clear, White said, that nothing should be allowed to interfere with the progress of the exploration work. Anything that discourages exploration also delays the full development of the existing fields and postpones reaching the long-term goal of self-sufficiency in petroleum which Canada is seeking.

White said it will be impossible to complete the Edmonton-Regina pipe line until sometime in 1950. Imperial, which is preparing to build this outlet, in the meantime hopes to move reasonable quantities of oil over moderate distances by rail, possibly to the head of the Great Lakes or to Vancouver as a temporary measure.

The Edmonton-Regina line, White said, will be 16 in. in diameter, 450 miles in length, and cost about $70,000,000. It will start with two pumping stations to move between 50,000 and 60,000 bbl. daily from the various producing companies in the Edmonton area. Later, if warranted, six more stations could be added to increase throughput to 100,000 or 120,000 bbl. daily.

For the construction of the line, a total of 70,000 tons of steel costing $13,000,000 will be required. White commented that it had been announced that 40,000 tons of steel plates had been arranged for in England to substitute for the steel for the pipe which is to come from Canadian mills. A Hamilton, Ont., company has been authorized to import enough slab steel from the United States to roll 18,000 tons of plate.

"The manufacture of this pipe," White said, "is an important Canadian achievement. This is the first time that such steel has been made within the Dominion, and also the first time that pipe of this size, type, and quantity has been made in Canada."

Discussing the rapidly changing Canadian petroleum supply, White said January saw what will probably be the last of the tank-car movements of crude from the Mid-Continent and Texas areas into Regina. "High-cost imported oil is being backed out and replaced by lower-cost crude from Alberta," he said. "One of the results of this drying-up process is the drop in prices of refined products in Alberta and Saskatchewan which took place last December."

As a result of the 225 exploratory wells drilled in Alberta the last 2 years, White said indicated reserves of the order of 600,000,000 bbl. have been proven, the bulk of these being at Leduc, Woodbend, and Redwater.

"This total does not include anything for seven promising showings that are still too young to be evaluated," he continued. "Among these is Imperial 1 Goldenspike, 5 miles west of Woodbend. In this well, the oil-bearing part of the D-3 zone has proved to be over 5 times as thick as it is at Leduc. This suggests that further drilling may prove Goldenspike to be another important addition to reserves."

Phillips Venezuelan Strike Spurs Drilling Program

Phillips Oil Co.'s new Eastern Venezuela discovery immediately west of Roble field is now producing about 1,000 bbl. daily, the limit of the pipeline outlet, and the company is drilling three offsets to the discovery as well as another test in the vicinity.

It was learned the discovery, B-1, is producing at present from the shallowest of the four zones tested. The well is considered capable of producing 2,000 bbl. daily. In the tests, the four zones from 7,740 to 8,500 ft. flowed at rates varying from 300 to 1,500 bbl. daily. The field has been named B-1 from the discovery well. A short pipe line is taking the oil into existing lines near the area which leads to the coast.

The new test is 1 Santa northeast of the discovery. At latest reports this well was below 6,500 ft. with an objective of 9,000 ft., according to reports. The location is believed to be on a separate structure.

In the B-1 area, Phillips Oil, which is a subsidiary of Phillips Petroleum Co., plans to drill seven wells in a hexagonal pattern. The present offsets are a part of this program. The well is on a 130,000-acre concession. The oil ranged in gravity from 40° to 45°.

Shell Receives Offshore Concession in Colombia

Cia. de Petroleo Shell de Colombia has received a concession from the Colombian Government to explore 21,222 hectares (52,500 acres) on the Continental Shelf off the Caribbean Coast, and according to reports from Bogota, the company may begin its first test in the area by midyear.

The company, which is associated with the Royal Dutch-Shell group, first solicited the acreage in 1943, and the firm concession was granted early in March. Royalty has been reduced to 8 per cent for this offshore development.

Another transaction dealing with Shell interests in Colombia was the recent transfer of assets of Cia. Colombiana de Petroleo La Estrella de Colombia, which holds the now producing Dificil concession, to Cia. Colombiana de Petroleo El Condor, which operates the Yondo concession. Both companies are associated with the Royal Dutch-Shell group. The move was described as consolidating El Condor's position as a producer. Dificil is now producing about 5,000 bbl. daily, and Casabe, some 17,000 bbl. daily.

Dutch to Make Oil Soap

De Bataafsche Petroleum Mij. (Royal Dutch-Shell) is building a factory at Pernis in the Netherlands for the manufacture of soap from a petroleum derivative. The Shell Group has been manufacturing the soap in Britain, and it is to be introduced in Holland shortly. B.P.M. operates a 16,000-bbl.-daily refinery at Pernis, and Caltex Petroleum Mij. is building a 20,000-bbl.-capacity refinery in the same area.

Coring and Production Methods Discussed by A.P.I. Division

by Roy F. Carlson

DISCUSSIONS of secondary recovery predominated among the technical papers presented at the spring meeting of the Mid-Continent district of the American Petroleum Institute division of production, held in Tulsa, March 23-25. Results and interpretation of core analysis, water flooding, gas injections, and productivity indices were also reviewed for the 700 persons attending the meeting.

J. H. Field, Sohio Petroleum Co., Oklahoma City, was elected chairman of this district of the institute's division of production. He succeeds Lloyd E. Elkins, Stanolind Oil & Gas Co., Tulsa, the 1949 chairman. Harold Berg, Tide Water Associated Oil Co., Tulsa, was elected vice chairman for Oklahoma; W. D. Maxwell, Carter Oil Co., Great Bend, Kans., vice chairman for Kansas; F. F. Kennedy, Stanolind Oil & Gas Co., Pampa, Tex., vice chairman for the Panhandle; and W. R. Gottshall, Continental Supply Co., Oklahoma City, secretary-treasurer.

Wheelock, Turner Speak

Opening the general session, R. L. Wheelock, vice president of the A.P.I. division of production, commended the members of the oil industry for their contribution to the nation's welfare. He complimented the industry for supplying crude oil at substantially the same price that has prevailed for several years while, simultaneously, increased taxation has driven upward the cost of the petroleum delivered to the consumer. He also spoke of the work the institute is doing to make people cognizant of the importance of the petroleum industry to everyone in the nation, and asked the members of the oil fraternity to help this cause.

The history of oil and oil legislation in Oklahoma was reviewed by Gov. Roy J. Turner. In touching upon the legislative picture as it now exists, he predicted some adjustments but no radical changes in the tax situation in the state. He praised previous governors and legislators and the industry for formulating a group of conservation laws that could well serve as a model for the nation.

Two of the technical papers dealt with cores, core analysis, and interpretation of core analysis. *(These are presented on pages 104 and 111 of this issue of The Oil and Gas Journal).*

One of these, which discussed contamination and the effect of such contamination in obtaining and interpreting results from core analysis on cores taken with oil or oil-base mud, was given by Ward M. Edinger, Production Engineering Laboratories, Oklahoma City.

The second paper on coring was prepared by R. C. Earlougher and J. M. Robinson of Earlougher Engineering Co., Tulsa. Relative value of rotary, cable tool, and electrodrill coring were discussed. The paper described methods of handling and sampling cores and illustrated that core analyses results when used together with other data from the field are far more useful and reliable than when used only by themselves. The new electrodrill method of obtaining cores was described as the best method of three.

Heterogeneity of that formation into which water is to be injected plays an important part in the operation of that water flood, and a method of predicting the effect of this heterogeneity from basic data such as porosity, permeability, saturation, and thickness, was given by Floyd E. Suder, Ohio Oil Co., Eureka, Kans., in a paper entitled "Water Flood Calculations." Co-author of the paper was Dr. John C. Calhoun, Jr., University of Oklahoma.

"Effect of Permeability on Recovery Efficiency by Gas Displacement," by W. O. Keller, G. W. Tracy, and R. P. Roe of Stanolind Oil & Gas Co., Tulsa, indicated that recovery efficiency is a unique function of capacity where all other variables affecting recovery efficiency are held constant. Calculations and curves presented in the paper were based on specific cases, one involving 11 hypothetical wells completed in a single zone of uniform permeability and thickness, and a second in which four completely separated zones are produced through a common well bore. It was stated that results and conclusions are quantitatively limited to the conditions evaluated, but that the examples would permit generalization as to the effect of permeability, thickness and permeability-thickness distribution upon the recovery efficiency of a depletion-type reservoir.

The question of tidelands oil exploration was discussed by Dean A. McGee, executive vice president, Kerr-McGee Oil Industries, Inc., Oklahoma City, a pioneering firm in the drilling of offshore wells. Recent developments in offshore drilling technique and equipment were illustrated. Developments in the design of offshore drilling structures since the first, built in 1938, were described, showing the two principal types of structures, the single large island type and the small island and floating drilling-tender type, and the new "stabilized sea drill" equipment used offshore.

Another of the 10 technical papers given during the meeting developed a method for estimating static bottom-hole pressures in wells which have extraordinarily long build-up times. The procedure is especially applicable to wells with low productivity indices where fluid flow is of one phase. Prepared by J. J. Arps and A. E. Smith, British-American Oil Producing Co., Tulsa, it demonstrated use of the method for wells from which data was taken by either pressure bombs, or fluid-level measurements.

R. C. Curtis and T. W. Brinkley, Carter Oil Co., Oklahoma City, pre-

Newly elected officers of the Mid-Continent district of the American Petroleum Institute division of production are shown in conversation at the recent meeting of that organization in Tulsa. They are Joseph H. Field, Sohio Petroleum Co., Oklahoma City, general chairman; Harold E. Berg, Tide Water Associated Oil Co., vice chairman for Oklahoma; W. R. Gottshall, Continental Supply Co., Oklahoma City, secretary-treasurer; W. D. Maxwell, Carter Oil Co., Great Bend, Kans., vice chairman for Kansas. F. F. Kennedy, Stanolind Oil & Gas Co., Pampa, Tex., vice chairman for the Panhandle, is not shown

sented "Calculation of Natural Condensate Recovery," describing an "approximate method of computing condensate reserves based on two empirical relationships developed from actual reservoir fluids, and requiring only the original gas-condensate ratio for estimation of ultimate condensate recovery in barrels per barrel of reservoir pore space."

Equipment and operation techniques used in handling and disposal of the large volumes of salt water produced with crude oil from the Arbuckle lime were discussed in a paper by L. B. Hicks and J. R. Hatfield, Cities Service Oil Co., Bartlesville, Okla. "Salt Water Disposal Practices in Kansas" reviewed the drilling program and described the tanks, piping and casing used in the completion of the input wells. Disposal is usually made into the lower Arbuckle lime, Granite wash, Reagan sand, or the Dakota.

As an answer to the question as to the merit of gas injection into dolomite or limestone reservoirs, Fred J. Neslage, West Pampa Repressuring Association, Pampa, Tex., outlined that group's cooperative gas-injection project. Recounting the history of the field and the repressuring program in the paper "Gas Injection in Dolomite Reservoirs," Neslage showed how input wells were selected and how the progress and results of the program were evaluated.

The final technical paper of the program was given by Harold S. Kelly and G. G. Hebard, Phillips Petroleum Co., Bartlesville. A history of the development of the present standard tubing joint, an outline of the joint's shortcomings, and a description of several types of new tubing joints designed specifically for use in high-pressure wells was given in the paper entitled "Tubing Joints for High-Pressure Wells."

Oil Industry Facing Good Prospects, Swigart Tells A.P.I. Tulsa Meeting

THE petroleum industry has nothing to hide and it expects to be in position to meet all needs in volume and quality—at prices which will aid and not hinder the march of progress in America, T. E. Swigart, president of Shell Pipe Line Corp., told the Mid-Continent district of the American Petroleum Institute in Tulsa, March 24.

In his address, "Where Our Industry Stands Today," Swigart forecast a possible increase of 5 per cent in the demand for crude oil during 1949, the domestic consumption to reach 6,000,000 bbl. per day.

In commenting upon the existing supply situation, Swigart said "gasoline is still king of products, and until the point of motor-vehicle saturation is reached, gasoline demand, and probably total demand, in this country will continue to grow." He added, however, that growth in the demand for distillate fuels has so increased that this product almost rivals gasoline in importance.

"Residual fuel," he stated, "is the product worrying refiners today. Residual is still the desired fuel for bunkers, but one of its other great markets, railroad fuel, is fast disappearing as a result of the railroad dieselization program. . . . Residual fuel comes into direct competition with coal and natural gas in other fields. Just how far refiners can go in replacing their lost fuel markets by pricing themselves into other markets is not clear." Swigart emphasized the competition between coal and residual fuels by pointing to the drop in fuel-oil prices and the corresponding subsequent reduction in the price of coal.

T. E. Swigart, president of Shell Pipe Line Co., as he addressed the Mid-Continent A.P.I. meeting

Describing the petrochemical industry's influence on petroleum demand, Swigart said, "during the past 20 years it is said that the petrochemical industry has doubled every 3 years. No one knows whether it will continue this rate of growth or not. Be that as it may, the future of this industry appears bright in itself and it regards the oil industry as an ample source for its raw materials, but the oil industry cannot regard it as an important outlet for its products."

Consumption of aviation fuels is an important quantity, he stated, though small in comparison to the total consumption of gasoline. Jet fuels are still of little importance from a demand standpoint.

"One of the most important facts brought out by a study of petroleum economics is the effect of shifting sources of supply," said Swigart. "The net effect of this on our domestic industry is the loss of some foreign outlets, but if we gear ourserves chiefly to take care of our domestic requirements we will still have a vigorous industry and one which promises growth from year to year."

"Unexpected postwar demand," he said, "led to a supply shortage, and this to a higher price for oil. Higher prices stimulated wildcatting, and wildcatting, in turn, yielded results." Areas of importance in supplying future demands for crude were said to be the Permian basin, the Texas and Louisiana tidelands, and the Rocky Mountain region. Swigart predicted that Middle East oil will relieve the United States and Venezuela of European demand.

Canadian oil is also of great importance to the oil economy of the United States, as is the petroleum of Mexico. Swigart said that in times of national peril reserves in these countries and those in the United States provide the greatest insurance.

Canada, Mexico Important

Adequate pipe-line capacity with enough reserves to back its construction is necessary to the development of Canadian oil, he said, predicting that the momentum set up by wildcatters may lead to the development of sufficient reserves, and if that happens, this oil supply will be reassuring in an emergency because of its location and because of the warm friendship existing between the United States and Canada.

"Mexico," he stated, "is almost as important to hemispheric defense as Canada. The common welfare and the friendship of Mexico and the United States assures that in case of aggression their oil resources would be pooled for the common defense. Thus, the existence of a thriving petroleum industry in Mexico is greatly to be desired."

In specific reference to oil from the Middle East, Swigart said, "this oil, despite its unfavorable transportation cost differential, will stand ready to supply any deficiencies in the United States. The conclusion seems justified that, barring war, which could cost the loss of Middle East supply, or the cutting off of these supplies by interruption of transportation, there will be no shortage of petroleum in the United States

or the world in the foreseeable future. History shows that we are always in a cycle of long supply or short supply despite the fact that demand has continued to increase. The present condition of long supply may be considered normal."

Speaking of the synthetics industry, Swigart said "the time may come when such an industry will exist, although I doubt if that time will arrive very soon. As the situation now stands, we are going to be reliant upon liquid petroleum reserves for an indefinite period." He remarked, however, that to reduce the interval necessary to construction of a synthetics industry in the event that outside supplies of petroleum are cut off, that research and pilot-plant operations should be pushed aggressively.

Answering critics of the industry's profits, he said "it is true that recent profits in dollars have looked large, but when the dollar is corrected for its purchasing power, as it must be if this question is looked at in proper perspective, these profits at once shrink by about 50 per cent. Other factors also have an important bearing on earnings. One reason for today's high profits is the sale of oil from underground reserves which were found in the days of much lower costs. To replace this oil for tomorrow is costing very much more. Also, new plants, which have to be built today, cost twice as much as those which they replace."

"There are only three money pools from which funds for financing the oil industry can be drawn. The first and easiest source is that provided by the annual reserve for depreciation and depletion. This is not enough to meet extraordinary capital needs, and in fact it will no longer take care of normal needs because depreciation represents the return of investments made at much lower cost. Second is the pool of net profits. If this is drawn on too heavily, the investor has to suffer through little or no return on his money. The third and last source of new capital is from borrowing. Everyone knows that this borrowing cannot go on indefinitely; after all, the industry must pay back borrowed money, and, over the long term, it must pay back as much as it borrows."

Requesting that more realism be directed to oil-industry financing Swigart went on to say "high income-tax rates on individuals, the double taxation of dividends, the constant rumblings of governmental displeasure over earnings and dividends and of the diversion of net earnings to capital replacements, do not create a favorable atmosphere for the saving individual who otherwise might be willing to risk his money in business ventures, and particularly speculative ventures such as the oil business."

Swigart added that it is reasonably certain that profits for 1949 will be lower, with capital requirements uncertain. He said that the petroleum industry "is a big industry that requires big money to keep it going, and it does not owe anybody an apology for having managed its financial affairs soundly and well."

A.P.I. Refining Division Completes Program for Houston Midyear Meeting

DISCUSSIONS on many problems of refining will take place during the midyear meeting of the Division of Refining of the American Petroleum Institute to be held at the Shamrock Hotel in Houston on April 4-7.

About 600 oil men are expected to attend and participate in sessions on such topics as corrosion, vapor-lock, refinery maintenance, waste disposal, and personnel training.

One of the highlights of the 4-day meeting will be presentation for the first time of certificates of appreciation to three outstanding petroleum technologists for their contributions to refining and standardization. The men are Walter Samans, Sun Oil Co., Philadelphia; Kenneth G. Mackenzie, The Texas Co., New York; and Thomas G. Delbridge, retired, formerly of Atlantic Refining Co., Philadelphia.

The dinner meeting of the division on Wednesday, April 6, will be addressed by Harold G. Osborn, vice president of Continental Oil Co., on the topic, "Helping Labor Be Worthy of Its Hire." Chester F. Smith, vice president of refining for Standard Oil Co. (N. J.), and A.P.I. vice president for refining, will also speak at the dinner meeting.

Most of April 4 and 5 will be devoted to meetings of 28 committees and subcommittees and to group sessions on rapid methods of analysis at which 14 papers will be presented. A symposium on rapid methods of analysis was held in connection with the general A.P.I. meeting in Chicago last November but because of the interest in the subject it is being resumed at the Houston division meeting.

The program for the other group sessions follows:

Training, April 5, 2:00 p.m.:

"Highlights on Some of the Challenges Indicated by the Survey on Refinery Training Practices," by Harry D. Kolb, chairman A.P.I. Committee on Training in Refining, Esso Standard Oil Co., New York.

"The Establishment and Application of a Job-Training Program," by E. G. Heckendorf, The Texas Co., Port Arthur, Tex.

"The Payout of Employe Training," by Alex S. Chamberlain, Ashland Oil & Refining Co., Ashland, Ky.

Corrosion, April 6, 9:00 a.m.:

"Hydrogen Blistering Reported by Several Oil Companies," by M. H. Bartz and C. E. Rawlins, Phillips Petroleum Co., Bartlesville, Okla.

"Hydrogenation-Plant Steels," by George A. Nelson, Shell Development Co., San Francisco, Calif.

"Corrosion and Stress Factors in Piping Expansion-Joint Failures," by H. F. Brown and W. M. Goryl, Standard Oil Development Co., Elizabeth, N. J.

"Cathodic Protection of Refinery Equipment," by Derk Holsteyn, Shell Oil Co., Deer Park, Tex.

Symposium on Vapor-Lock Problems, April 6, 2:00 p.m.:

Addresses by: J. M. Crawford, General Motors Corp., Detroit; Paul Huber, Willys-Overland Motors, Inc., Toledo; Victor G. Raviolo, Ford Motor Co., Dearborn.

Management of Refinery Maintenance, April 7, 9:00 a.m.:

"Control of Maintenance Costs," by R. S. Stewart and H. A. Gustafson, Standard Oil Co. (Ohio), Cleveland.

"Decreased Maintenance Costs by Better Scheduling," by H. H. Linnell, The Texas Co., Port Arthur, Tex.

"Preventive Maintenance," by R. W. Tryon, Esso Standard Oil Co., New York.

"Maintenance Shops: The Layout and the Tooling," by Ditmas Bromley and Henry P. Evans, C. F. Braun & Co., Alhambra, Calif.

Waste Disposal, April 7, 2:00 p.m.:

"A Method of Conditioning of Refinery Effluent for Reuse and Disposal," by F. M. Faulconer, D. L. McCann, and H. L. Bedell, Socony-Vacuum Oil Co., Inc., Augusta, Kans.

"The Biological Measure of Stream Conditions," by H. Radclyffe, Academy of Natural Sciences of Philadelphia, Philadelphia.

"Disposal of Spent Chemicals from Petroleum Refining," by L. C. Burroughs, Shell Oil Co., Inc., New York, and R. W. Carnahan, Shell Oil Co., Inc., Wood River, Ill.

"Oil Separator for Refinery Waste-Water Disposal," by G. E. King, Standard Oil Co. (Ohio), Cleveland.

Oil Executives Discuss Payroll Savings Plan

First of a series of meetings of senior executives of the petroleum industry, approved at the last meeting of the National Petroleum Council, to discuss the payroll-savings plan was held in New York City March 18, under sponsorship of Gen. James H. Doolittle, now vice president of Shell Union Oil Corp.

N.P.C. unanimously approved the series of meetings, inviting the voluntary support of every company in the industry in furthering the payroll-savings plan for U. S. bonds.

The special petroleum-industry payroll-savings promotion has been set for April 18 to May 14, and it is planned that each company in the industry will give attention to advancing its payroll-savings plan during this period. Similar meetings will be held in Tulsa, Dallas, Houston, Los Angeles, and San Francisco.

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Economic and Technical Trends Feature W.P.R.A. Convention

by George Weber
Refining Editor

SAN ANTONIO.—Indicating an important item of current concern among refiners in this post-shortage period, the subject of economics supplied a dominant underlying note in discussions at the thirty-seventh annual meeting of the Western Petroleum Refiners Association early this week.

Reports on widely divergent subjects — new technical developments, comparisons of established processes, future requirements for jet fuels, and the general petroleum outlook—all were considered directly or indirectly in the light of their economic significance.

In presenting results of a thorough commercial comparison of hydroforming and thermal reforming, N. H. McLaurin, C. M. McIntosh, and D. S. Kaufman of The Texas Co., New York, pointed to little difference in the economics of the two processes as applied to sweet and sour heavy naphtha stocks. When reforming to a given octane number, thermal reforming showed an economic advantage over hydroforming up to 78 A.S.T.M. motor octane, above which the cost advantage reversed. These findings, based solely on operating costs, would become weighted to favor the thermal process if plant investment were included.

"Platforming" Introduced

A new catalytic process termed platforming was announced as part of the paper entitled "Trends in Petroleum Refining" by Edwin F. Nelson of Universal Oil Products Co. Employing platinum, the new process for improving straightrun or natural gasolines combines the best features of hydroforming and thermal reforming, said Nelson, to result in large octane number gain, low volumetric loss and moderate plant and operating costs. In platforming, naphthenes are converted to aromatics, high-boiling paraffins to lower-boiling ones, and low-boiling paraffins are isomerized, thus providing a desirable reaction pattern for almost all parts of the charge.

Refiners were brought up to date on military jet-fuel desires which center on the imminent formal acceptance of the JP-3 fuel by the Air Force. This successor to JP-1 will comprise a wide range cut with gasoline, kerosine, and light distillate components. Its adoption stems not from greater efficiency but from greater potential availability. The fact that the new fuel is slightly less efficient on a volume basis is unimportant, refiners were told. Higher energy release on a volume basis, the long range problem in future jet-fuel development, indicates first the use of solids or heavier liquid cuts, technically unusable at present. Eventual resort to synthetic fuels, a far future development, was noted as prerequisite to extending jet aircraft ranges materially.

Another new refining process was discussed from the standpoint of its economic application to present-day refining in the paper entitled "Various Refinery Applications of Houdriflow Catalytic Cracking" by Peavy, Weinrich, Hornaday, and Noll of Houdry Process Corp., Philadelphia. Laboratory investigations of distillate fuel-oil stability were reported by E. L. Korb, H. J. Scheule, and R. O. Bender of E. I. du Pont de Nemours & Co.'s petroleum laboratory, Wilmington. They gave results of accelerated tests and emphasized the need for a correlation of such procedures with field information before eventual solution of the problem is realized.

In reviewing recent developments in the petroleum supply picture and presenting the 1949 outlook, E. O. Thompson, Texas Railroad commissioner, stated that world production of oil has passed by far the present world consuming ability. Expressing agreement with the policy of supplanting domestic production with imports when needed, he declared that we are not now short of oil and imports to this country should be promptly reduced.

Fuel Trends Surveyed

Reports of three fuel committees indicated certain trends in the use of motor fuel, tractor fuel, and diesel fuel. Participating in the cooperative diesel-fuel research project, the W.P.R.A. diesel-fuel committee reported progress according to schedule. Railroad testing of certain recommended fuels will get under way soon, in actual main-line operations in various parts of the country. The motor-fuel committee, reviewing the nature of refinery construction over the past year and the introduction of new automobile models with higher compression ratios, declared the trend to higher octanes as established, and announced plans to initiate shortly a survey of fuel characteristics marketed since the first of the year and for the spring and summer demand. The tractor-fuel committee is conducting a survey aimed at determining the quantities of the two grades of tractor fuels (light and regular) that are commonly used for the distillate-type engines. It noted the tendency of tractor manufacturers to produce more gasoline-type than distillate-type engines.

W.P.R.A. Meeting Names McDowell As President

SAN ANTONIO.—Robert W. McDowell, executive vice president of Mid-Continent Petroleum Corp., Tulsa, was elected president of the Western Petroleum Refiners Association for the ensuing year. He succeeds H. T. Ashton, manager, central marketing region, Socony-Vacuum Oil Co., Inc., St. Louis.

R. W. McDOWELL

Vice presidents elected are: R. L. Tollett, president of Cosden Petroleum Corp.; F. L. Martin, executive vice president of Sunray Oil Corp.; H. E. Zoller, president and general manager of Derby Oil Co.; and Roland V. Rodman, president of Anderson-Prichard Oil Corp.

New directors are: W. J. Carthaus, assistant to the president, Deep Rock Oil Corp.; Harry J. Kennedy, vice president of Continental Oil Co.; and Brown Meece, vice president of Globe Oil & Refining Co.

Antitrust Violation Denial Filed by Eight Companies

AUSTIN.—Eight of the ten major oil companies charged with antitrust violation in Texas *(The Oil and Gas Journal, February 24, page 90)* denied the charges last week when they filed their answers in the Ninety-eight District Court.

Two other companies—Sinclair Refining Co. and Magnolia Petroleum Co.—were granted delays in replying to the charges filed February 21 by Atty. Gen. Price Daniel.

In answering the charges the companies reported that the petition of the state was "general, vague, and indefinite" and failed to point out any violation of antitrust laws.

Humble in its reply contended that a Ninety-eighth District Court judgment handed down October 3, 1938, cleared it of the alleged antitrust law violation charged by the state.

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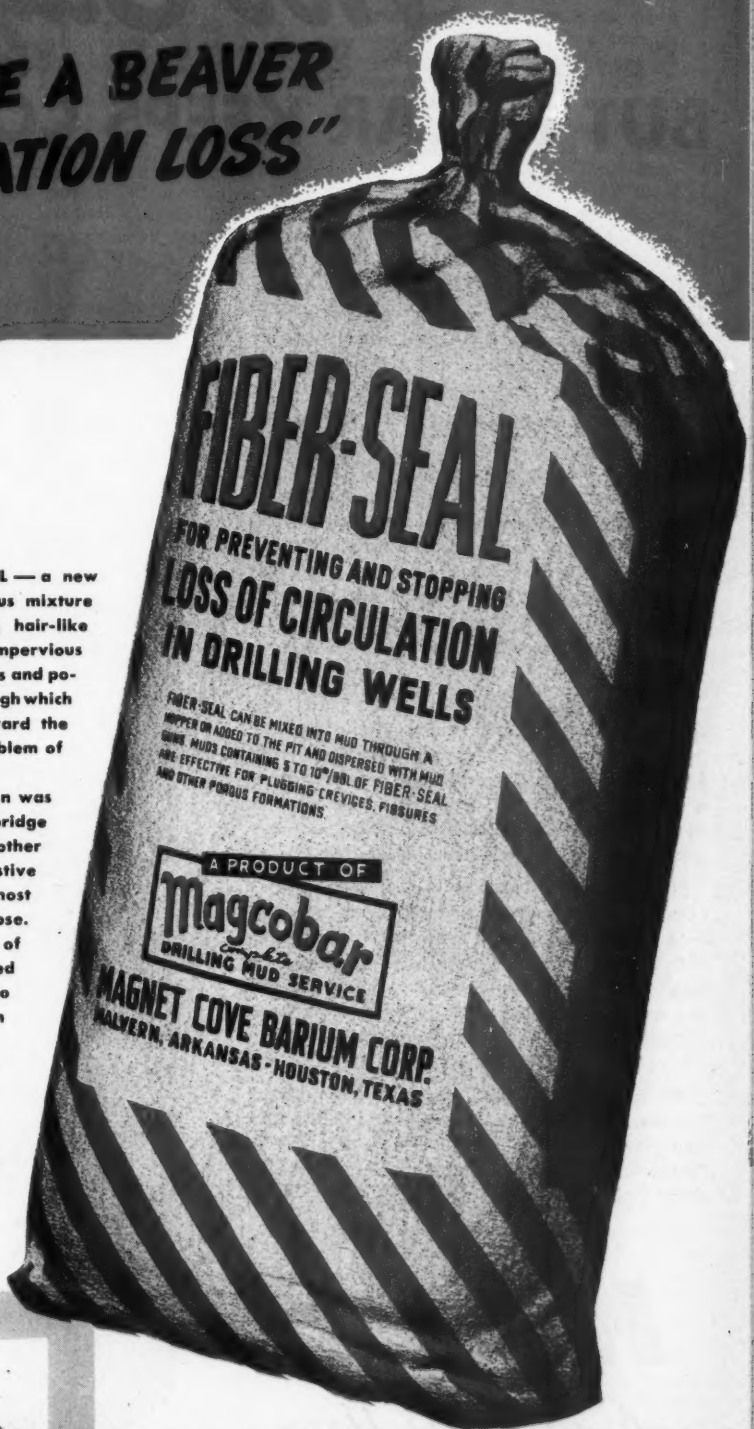
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The manufacturer, Kobe, Inc., tried out several packing materials that would operate the pump under these "tough" conditions. He finally chose Hycar American Rubber because it would meet *all* the demands made upon it. In doing so he revealed the amazing characteristics of this modern industrial product.

Hycar American Rubber can withstand both abrasion and high temperatures . . . it can combine great strength and firmness with remarkable elasticity . . . it will give long service as demonstrated by the fact that no "free pump" has ever had to be pulled because of packing failure! Which will lead many to ask, "Can Hycar help me too?" Most times it can!

We make no finished products from Hycar but we are always glad to supply information and give help on special problems. Write B. F. Goodrich Chemical Company, Dept. HE-4, Rose Building, Cleveland 15, Ohio.

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Phillips Petroleum Achieved High Operating Level in 1948

DURING 1948 Phillips Petroleum Co. attained record levels of operations, continued projects designed to utilize the company's varied reserves of raw materials, enlarged natural-gasoline production, and formed Phillips Chemical Co. to conduct chemical operations.

Drilling activity during the year was the greatest in the company's history, with full or part interest being held in 815 well completions, including 518 oil wells, 153 gas wells, and 144 dry holes. A total of 104 exploratory wells opened up 17 new oil fields and 2 new gas fields. Crude oil reserves proven during 1948 were nearly twice the company's withdrawals.

New discoveries were developed in Casper, Wyo.; Brazoria County, Texas; Garvin and McClain counties, Kansas, and offshore sites in Copano Bay, Corpus Christi, Tex. Beneath waters off the coast of Louisiana four producing oil wells were completed.

Net crude-oil production for the year was 39,880,964 bbl. (110,498 bbl. daily average), as contrasted with a crude production of 34,740,758 bbl. (96,307 bbl. daily average), in 1947. Secondary recovery by water flooding, and increased use of unit-management programs to gain benefits through pressure maintenance by gas injection, increased the output of a number of pools.

The company's eight refineries handled crude runs to stills totaling 51,111,274 bbl. in 1948 (167,000 bbl. daily average), as compared with 33,498,483 bbl. (127,000 bbl. daily average) in 1947.

The refinery at Sweeny, Tex., was enlarged during the year to operate at a rate of 45,000 bbl. per day. A new plant at Kansas City, Kans., for the manufacture of lubricating components started operations during the year. Construction of a new 24,000-bbl. catalytic cracking unit at the Kansas City refinery is well under way.

In midyear, Phillips organized Phillips Chemical Co. to conduct chemical operations, which at present consist mainly of furnace black for rubber compounding and anhydrous ammonia for fertilizer manufacture. Construction in progress will double the capacity of an anhydrous ammonia plant near Amarillo, Tex., which is currently producing 70,000 tons a pear. Another plant to furnish 100,000 tons per year of ammonium fertilizer will be constructed near the Amarillo plant.

Net earnings per share of stock in 1948 were $12.01 as compared with earnings per share in 1947 of $8.11.

Annual Reports

The Journal here presents the 1948 operating highlights of a number of oil and gas companies as revealed in their annual reports.

Last week's issue contained reviews of Shell Union, Standard of Ohio, Lone Star Gas, Sunray, Ohio Oil, Texas Gulf Producing, and Texas Pacific Coal & Oil. The March 17 issue contained reviews of Skelly, Sun, Texas, Union, Continental, and United Gas. In similar manner the March 10 issue covered the reports of Standard of Indiana, Pure, Barnsdall, and Wilcox. During the next few weeks the activities of other companies will be summarized as their reports become available.

Deep Rock Increased Reserves Through Purchase During 1948

INCREASED producing activity during 1948 for Deep Rock Oil Corp. resulted from the purchase of controlling interest in the firm of Sloan & Zook, Deep Rock declared in its annual report.

Designed to strengthen the company's crude-oil position, the association with Sloan & Zook achieved the drilling of 223 wells in the 6-month period in which Deep Rock had an interest. These included 78 producers, 129 water-input wells, and 16 dry holes. At the close of the year, Deep Rock held part interest in 1,962 oil and gas wells, as compared with 175 at the end of 1947. Through Sloan & Zook, Deep Rock is operating properties in Pennsylvania and Eastern Kansas directly and, through partners, is operating properties in Southern Oklahoma, and West and North Central Texas. Extensive water-flooding operations were carried on in Eastern Kansas during 1948 and plans call for continued development of water-flood recovery this year.

Exclusive of Sloan & Zook, Deep Rock drilled 56 wells during the year, including 33 oil wells, 22 dry holes, and 1 gas well. The company extended its producing activities into West Texas, New Mexico, and the Rockies, acquiring acreage in the Big Horn Basin in Wyoming. At year's end Deep Rock held leaseholds or royalties on 316,498 acres, of which 30,960 acres were productive of oil and gas, and 285,538 acres were undeveloped.

Net crude-oil production for the year was 3,009,000 bbl. (8,220 bbl. daily average), as contrasted with net crude production of 2,756,000 bbl. (7,550 bbl. daily average) in 1947.

Crude runs to stills in 1948 were 4,529,000 bbl. (12,373 bbl. daily average), as compared with crude runs of 4,350,000 bbl. (11,900 bbl. daily average) in 1947.

Deep Rock completed a propane plant during the year to meet increased demand for liquefied petroleum gas. Delivery of company products through the Great Lakes Pipe Line System, connected to the Cushing, Okla., refinery, were increased during 1948.

Net earnings per share of stock in 1948 were $7.64 as compared with net earnings per share in 1947 of $6.45.

Lion Oil Co. Increases Interest in Chemicals

LION OIL CO. in its annual report indicates that during the coming year the company will endeavor to further development of crude oil and natural-gas production, increase operations in the chemical products division, and continue research to develop new methods and products.

Augmented by the purchase of a former government chemical plant in El Dorado, Ark., for $10,500,000, Lion Oil's chemical products assumed an important place in the company's business in 1948, accounting for about $15,000,000 in sales. The company's principal chemical products are ammonium nitrate fertilizer, nitrogen fertilizers, anhydrous ammonia, and aqua ammonia. A $7,000,000 expansion program for the refining and chemical divisions launched in 1948 will make possible the marketing of ammonium sulphate through construction of several new plants.

Net crude production rose to 5,049,260 bbl. (13,830 bbl. daily average) in 1948, as contrasted with 4,111,573 bbl. (11,260 bbl. daily average) in 1947.

Net earnings per share of stock in 1948 were $10.02, as contrasted with earnings per share in 1947 of $6.83.

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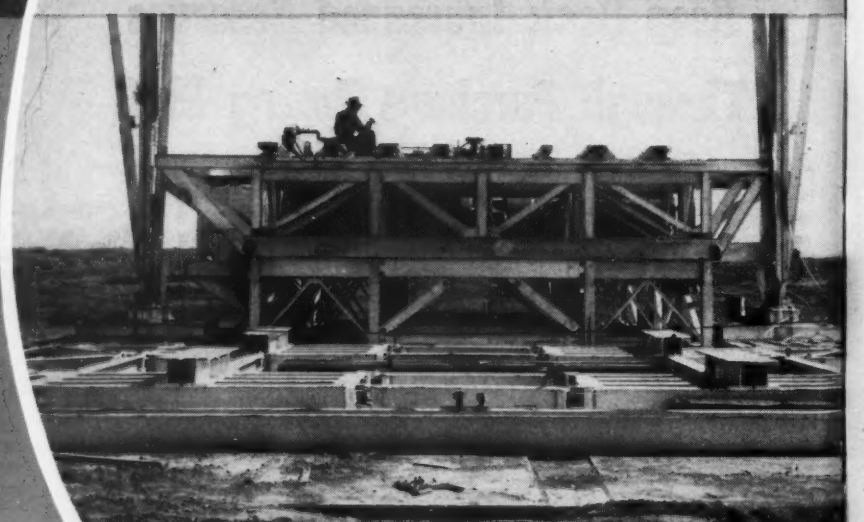
Above shows modern Lee C. Moore substructures for derrick floor, drawworks and power unit. The derrick substructure posts are positioned to take, most efficiently, the rotary and set back loads with minimum span of beam members, therefore maximum headroom is obtained for given floor height. Please note derrick substructure is independent of derrick and drawworks support is independent of derrick substructure.

Picture to right shows unitized pin connected grillage which accomplished proper distribution of loads on reinforced concrete mat. Picture taken before installation of derrick sub-structure. Also shown is well end of drawworks support. Note welded benches sized for transportation and provided with heavy pin connections for fast assembly.



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WASHINGTON WATCHING

BY BERTRAM F. LINZ

Troubles for ERP

WASHINGTON.—Paul G. Hoffman, brought to Washington from the Studebaker company a year ago to head the Economic Cooperation Administration, may resign after Congress approves the new appropriation for the European Recovery Program and is seen certain to do so if the money is hedged around with requirements to give preference to handpicked business groups in this country.

Hoffman is perfectly willing that American producers supply as much as possible of the commodities procured by the Marshall plan countries under the program, but his first concern is with the revival of the European economy and he does not look with favor upon proposals that have been submitted to use it to support our own economy, such as making it a vehicle to dispose of surplus agricultural products.

At the same time, there is a growing awareness in industry that the European Recovery Program is designed to lessen the dependence of the Marshall plan countries upon the United States and put them in a position to compete with this country in Latin America and elsewhere.

If successful, the program could cut our European exports by 40 per cent and lose to us a good half of our markets in Latin America. By next year, under the program which has been outlined, Western Europe will begin to reduce imports from the United States markedly, and already some countries, England notably, are reaching out for our markets for oil and other commodities.

In some quarters, it is believed that the ERP will have to be continued after 1952, not so much for the purpose of further aiding Europe as to insure outlets for our exporters. Otherwise, it is predicted, the recovery of Europe may result in a depression in the United States.

Job Seeks Man

ANNOUNCEMENT of the appointment of Robert E. Friedman as director of the Oil and Gas Division is expected to come within the next few weeks, possibly timed to the April 27 meeting of the National Petroleum Council.

Friedman, who has been acting as director of the division since Max W. Ball resigned last year, was not an active candidate for the post, but was practically forced into it by the inability of Secretary Krug to induce an industry man to take the job.

For many months before he finally quit the department, Ball was casting around for a successor. Before election, nobody in the industry wanted the desk because of the uncertainty as to who was going to run the Washington show; since election, nobody has wanted it, apparently because of uncertainty as to whether Krug would stay on, who his successor would be in the event he didn't, and what, if anything, was going to be the policy of the administration with respect to oil.

In one respect, the new director will have smoother sailing than did Ball who, however, had the happy ability to roll with the punches and could hold his own with carping congressmen. The problems of domestic shortage and world supply, both in oil and steel for oil, are no longer points which congressional committees are anxious to investigate and where, a year ago, there were anywhere from one to five oil hearings going on at the Capitol almost daily, only the foreign affairs committee has touched on the subject so far this year.

No Atomic Threat

DEVELOPMENT of atomic energy will have little effect upon the oil and other fuel industries and, in fact, will have little influence upon American industry generally, it is believed by scientists who have been studying the matter.

Generally speaking, industry locations are decided upon one or another of relatively few factors—the need to be close to fuel supplies or markets or materials.

Thus aluminum plants, using tremendous amounts of current, seek locations close to cheap water-power sources, while such industries as leather, with little fuel consumpion, are not concerned with that problem; bakeries must locate close to consumers regardless of power costs; paper and pulp mills use considerable power, but must secure locations favorable to both materials and markets. The steel industry is outstanding as one where location must be as close as possible to ore, fuel, and other supplies, with adjacency of markets an added advantage.

All of the industries which use power would like to get it cheaper, but there is nothing in the atomic-energy picture today to indicate that it will be able to undercut presently used fuels, and it is estimated that under even the most optimistic production costs for atomic energy coal would have to go to around $22 a ton before a switch would be economical.

There is nothing in the picture today to indicate the United States would secure a marked saving from the use of atomic energy so long as our supplies of oil, natural gas, and coal hold out. For a country like Russia, however, it could prove highly important because of its tremendous area with heavy transportation costs for coal, less concentration of industry and markets, and absence of a pattern of industrial location such as has developed in the United States.

So far as the industrially backward countries of South America and Africa are concerned, it is pointed out that several of them have fuel supplies which have been only indifferently developed, and there is nothing to indicate that atomic energy will prove a shot in the arm that makes them industrially minded overnight.

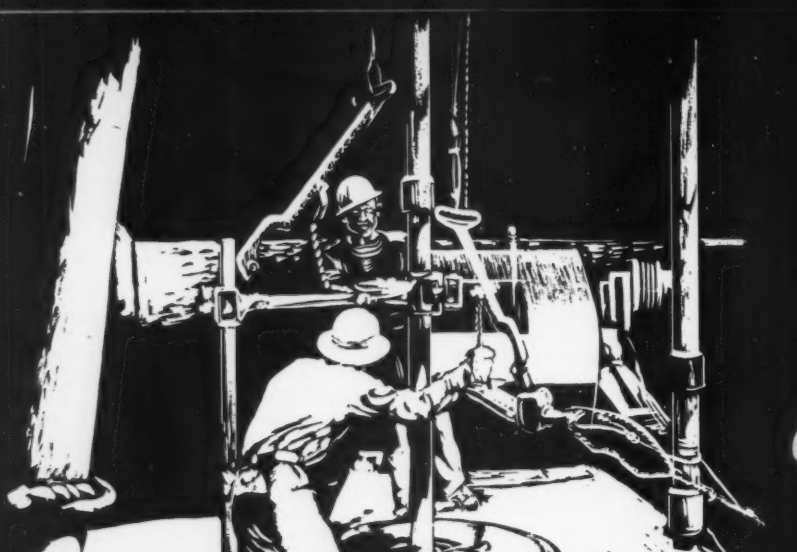
Tidelands Post Office

REP. CLAIR ENGLE of California introduced a bill in Congress last week to restore title to the tidelands to the states, and had the unusual experience of having his measure amended by the Government Printing Office to provide for erection of a post-office building in Bolivar, Mo., the same state from which hails Sen. Forrest C. Donnell, arch enemy of state-ownership of the tidelands.

In all fairness, however, it should be stated that Donnell did not toss the post office into the tidelands, since he is understood to believe that post offices and submerged oil fields should both belong to the federal Government.

The Congressional Record, generally speaking, is one of the best-edited daily publications in the country, although its editorial material often leaves much to be desired. Once in a while, though, even the Record nods, and when it does the result is frequently interesting.

Because a linotype operator duplicated one line in a preceding bill, introduced (just to keep the record straight) by Congressman Christopher of Missouri, and then inserting it in Engle's measure, the latter became, in the Congressional Record only, a bill "to confirm and establish the titles of the state to lands beneath navigable waters within state boundaries and in Bolivar, Mo., a post-office building."



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More Funds for Oil Activities Given to Interior Department

WASHINGTON.—The Interior Department appropriation bill for the 1950 fiscal year was introduced in Congress this week, carrying a total of $536,112,000 which is $127,222,000 more than was provided for the current year but $80,600,000 less than estimated in the budget.

With the exception of funds for the Oil and Gas Division and for synthetic liquid fuels, larger appropriations for oil activities will be available at the beginning of the fiscal year, July 1, next.

The fund for the Oil and Gas Division was held at the current level of $325,000, which is $75,000 less than requested, with $175,000 earmarked as usual for enforcement and administration of the Connally "Hot Oil" Act. Actually, however, this will necessitate economies in operation since the OGD will be required to absorb salary increases ordered by Congress last year.

More for Investigations

The Bureau of Mines was given another installment of $9,750,000 on its $60,000,000 program for development of synthetic liquid fuels, the same as for this year, a request for an increase of $250,000 being denied.

The bureau did better in other respects, however, being given an increase of $44,000 to cover salary increases for the staff engaged in oil and gas investigations. The bill carries $650,000 for this work, $40,000 less than requested. An appropriation of $97,500, the amount sought, was provided for helium utilization and research, an increase of $6,500.

The bill provides $3,300,000 for administration of the public lands by the Bureau of Land Management, $492,500 less than requested but $300,000 more than provided for the current year. The increase, however, will not entirely cover the salary raises ordered by the last Congress.

The Geological Survey will receive $3,500,000 for geologic surveys, an increase of $875,000 representing the full sum requested, which, after allowance for salary increases, will provide a net increase of $714,000.

The survey also was given $425,000 for investigation of mineral resources of Alaska, $100,000 more than available this year but $75,000 less than requested, with the increase earmarked for investigation of permafrost conditions and petroleum deposits in the territory.

Another $725,000 was provided for the survey's mineral-leasing activities, a reduction of $21,000 below the estimate but $35,000 more than provided this year.

In its report on the bill, the House appropriations committee criticized the department for failure to develop a pattern or principle upon which the appropriation structure can be based, pointing out that its appropriations "do not conform to organizational, functional, or geographical classifications of activities," and was also critical of its presentation of estimates, suggesting that a uniform and simplified basis be developed.

Court Asks Halt to Gas Flaring in Texas Field

AUSTIN.—Operators in Flour Bluff field in Nueces County last week were ordered to stop flaring gas.

This ruling by the Third Court of Civil Appeals was the second court decision in recent weeks to uphold the Railroad Commission's order to shut down certain Texas oil fields for wasteful flaring of gas. The state Supreme Court recently ruled in favor of the commission order concerning Heyser field of Victoria and Calhoun counties. However, the court said at the time it was not prejudging issues in the 14 other fields which had obtained injunctions against the shutdown.

In the Flour Bluff decision the court said "a careful study of the entire record leads us to the conclusion that the shutdown order was neither unreasonable nor arbitrary."

Operators in the field said that they were doing everything possible to utilize the gas being flared but the commission order did not give them enough time to construct facilities needed for the change.

Representatives of Flour Bluff Oil Co., Barnsdall Oil Co., and Humble Oil & Refining Co. had previously testified that compressors are expected to be installed by next May to put gas into the pipe line serving the field. Testimony was presented showing that 275,000 bbl. of oil would have been unrecoverable if the shutdown had become effective December 1 and lasted through next May. Such a shutdown, it was argued, would damage some of the wells to such an extent that they could never be restored to production.

Testimony also was presented showing that the loss of gas through flaring would equal 217,000 bbl. of oil in heating value.

The present flurry of court action is the result of 16 orders which the Railroad Commission issued last November 23 to shut down fields producing around 400,000 bbl. of oil daily. Effective date of the orders was set for December 1. Temporary and permanent injunctions blocked the commission in 15 of the fields. In the sixteenth, a new order was issued to allow the operators to produce a reduced amount of oil.

Next Week

Drilling into nothing?—Well, maybe it isn't that bad, but in the Dollarhide field of West Texas cavernous conditions are encountered where the drilling bit drops unsupported. In some instances this is only a few inches but in other wells it is through voids as much as 16 ft. District Editor D. H. Stormont of the Journal describes a development of "dry" or lost circulation drilling by Pure Oil, to meet this unusual condition; Stormont also details other features of the reservoir, completion practices, etc., at Dollarhide.

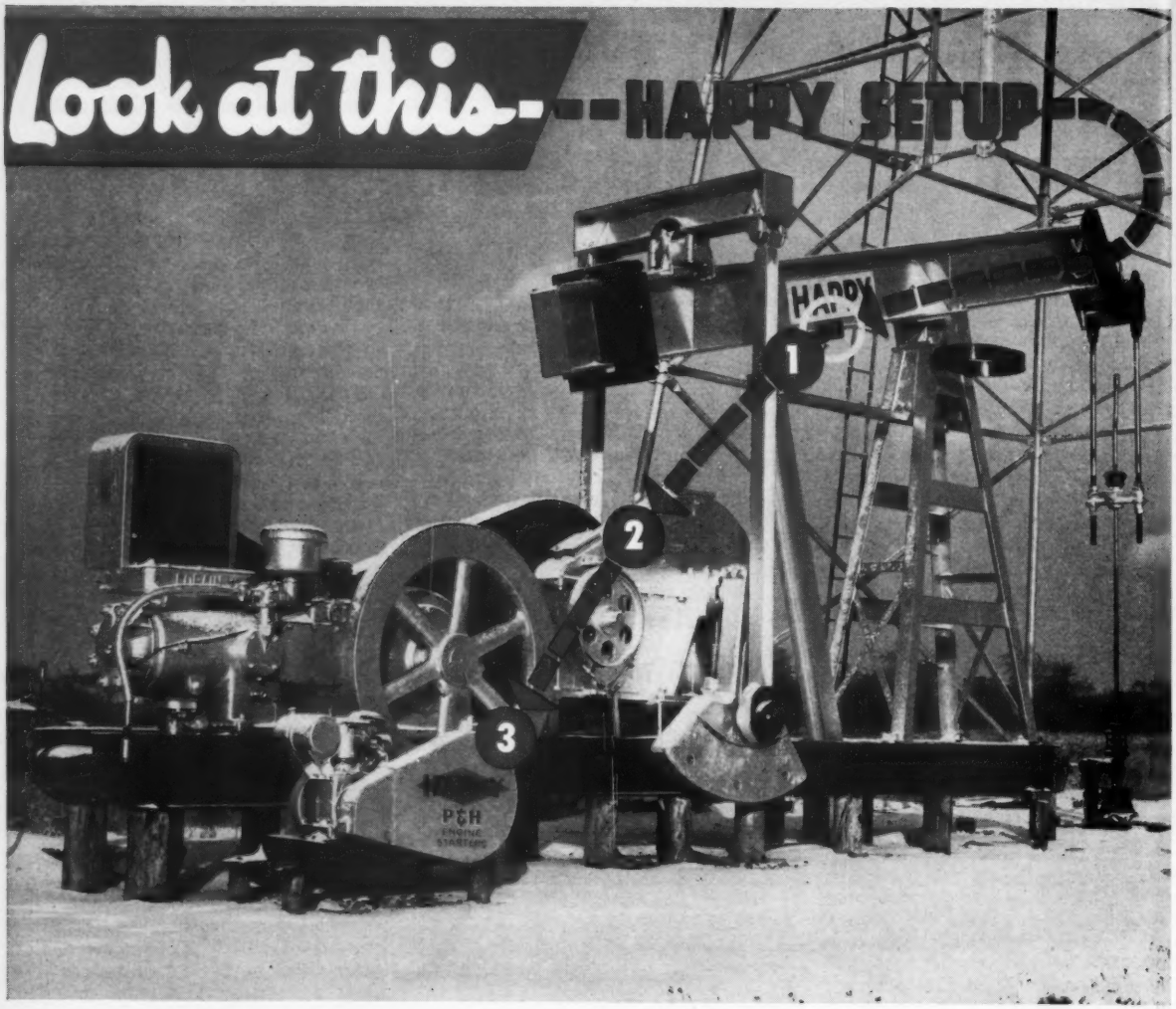
"Exploratory Drilling," by Frederick H. Lahee.—The chief geologist for Sun Oil Co. gives his annual state-by-state account of exploration activity, including data on new oil producers, dry holes, and footage drilled. This past year 18.3 per cent of the holes drilled and 12.9 per cent of the footage drilled culminated in successful producing wells.

"Platforming," a new catalytic development.—This reforming process for improving straightrun and natural gasoline is just announced. A platinum catalyst is used, the new process gets its name from a combination of "platinum" and "reforming."

The West Red River oil field.—Four engineers from the U. S. Bureau of Mines describe results of operating practices which have been used in this field, including natural depletion, vacuum, repressuring, and water injection.

Economics of refinery cracking operations.—Four refinery engineers with Houdry Process Corp. examine this subject. They select four typical methods of refinery operation (thermal cracking alone, and combinations of catalytic cracking with vacuum distillation, visbreaking, and delayed coking), and work out analyses of investment, payout, and earnings for each, under present economic conditions.

Look at this---HAPPY SETUP---



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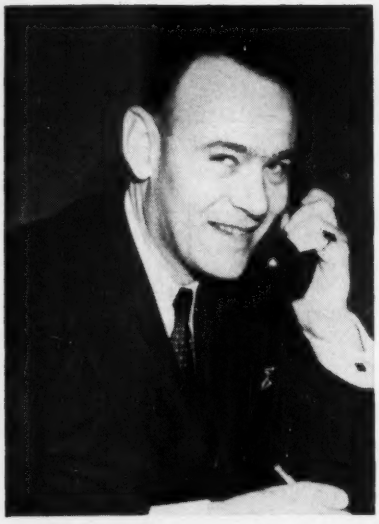
Wichita	Kansas
Ellinwood	Kansas

PERSONALS



Marshall Directs A.P.I. Marketing-Division Meet

HEADING activities of the midyear meeting of American Petroleum Institute's division of marketing, to be held in St. Louis May 9-10, is J. Howard Marshall, president of Ashland Oil & Refining Co., well-known marketing executive who was elected vice president of the A.P.I. division of marketing at the annual meeting in Chicago last November.

Marshall is well qualified for his role as head of the division, having had wide experience in the marketing field. Formerly chief counsel and assistant deputy administrator for Petroleum Administration for War, Marshall was named president of Ashland Oil & Refining in 1944, succeeding Paul G. Blazer, who remained as chief executive officer with title of chairman of the board of directors.

A graduate of Yale law school, Marshall was assistant dean until 1933 when he went to Washington as assistant solicitor in the Department of the Interior, and was made a member of the Petroleum Administrative Board. In 1935 he resigned from public service to become special legal and economic counsel to Standard Oil Co. of California. He remained with that firm until 1937 when he resigned to become associate attorney in the law firm of Pillsbury, Madison, and Sutro. He became a partner in the firm in 1938. He served PAW from June 1941 until August 1944, when he resigned to return to private industry.

For a time Marshall served as a member of the Federal Tender Board for East Texas oil fields.

H. S. Bell, formerly president of H. S. Bell, Inc., and author of "American Petroleum Refining," has become associated with Frederick Snare Corp., New York City.

Edward R. Valentine, vice president of Fullerton Oil Co., has been elected first vice president and a member of the board of directors of the Automobile Club of Southern California.

James L. Arthur, Shell Oil Co., Inc., division exploitation engineer, has been elected president of the Ventura Shell Club, Ventura, Calif. **Clifford J. Edmundson** was elected vice president.

Paul E. M. Purcell, geologist and geophysicist, and associated with exploration work for 21 years with U. S. Geological Survey, Shell Oil Co., Inc., British-American Oil Producing Co., and Universal Exploration Co., has entered private contracting business at Wichita Falls, Tex. He was with Universal the past 4 years as district manager at Wichita Falls. His new firm, known as Purcell Exploration Service, is located in the Hamilton Building in Wichita Falls.

Ford Bankston, formerly district engineer for Atlantic Refining Co. in Corpus Christi, Tex., and later in the company's Dallas office, has joined Southern Minerals Corp. as field engineer in Richard King field in Nueces County, Texas. Bankston replaces **T. C. Douglas, Jr.,** who has been moved from the field to the company's office in Corpus Christi.

Orville Harden, vice president of Standard Oil Co. (N. J.) and a company director, has been decorated by the French Government with the Order of Commandeur of the French Legion of Honor. Harden has been an officer of the Legion of Honor for more than 10 years, and the new award was given in recognition of his cooperation with the French Government in the field of petroleum. Last year he took a leading part in the negotiations which led to a revised agreement among the partners of Iraq Petroleum Co., Ltd., including Jersey Standard and Cie. Francaise des Petroles. On the Jersey company board, Harden's responsibilities include supervision of foreign operations. He joined the company in 1910 as an office boy and at the age of 35 was named a director, one of the youngest men chosen for the post in the history of the company.

Clyde L. Hays, Stanolind Oil & Gas Co. gravity-meter party chief at Freeport, Tex., has been placed in charge of a gravity-meter party at Laredo, Tex.

Leslie A. (Les) Leuzinger has been appointed petroleum engineer in the Rangely field of Colorado for Union Pacific Railroad Co.'s Oil Development with headquarters at The Texas Co. plant. **Basil V. Savoy** is also with the company as junior petroleum engineer, headquartered at Rock Springs, Wyo.

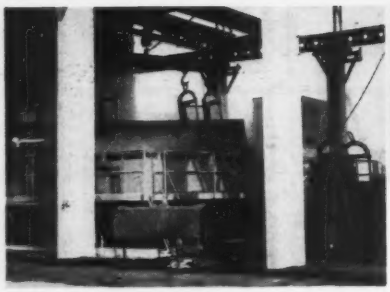
Dan R. Dunnett, petroleum engineer, Oklahoma Corporation Commission, has been named assistant director of conservation of the corporation, succeeding **Lawrence R. Alley,** who resigned.

T. S. Petersen, president of Standard Oil Co. of California, has been elected to the board of directors of the Pacific Mutual Life Insurance Co.

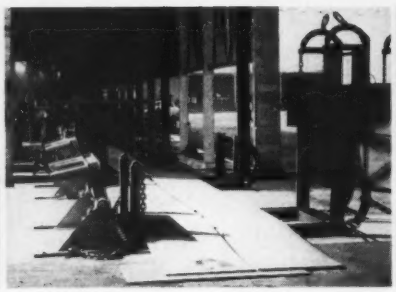
Walter J. Osterhoudt, widely known in geophysical and geological circles, particularly in the Gulf Coast and Rocky Mountain areas, has resigned his position with Gulf Oil Corp. in Houston, and will engage in consulting work, specializing in coordinating geophysical, geological, and drilling data. He will maintain headquarters both in Houston and Chromo, Colo. During nearly 19 years with Gulf, Osterhoudt has worked in nearly all active oil areas in the United States, as well as in Mexico and Venezuela.

Henry Witcher, former superintendent of Sinclair Prairie Oil Co. gasoline plant near Seminole, Okla., is now superintendent of the Barnhardt, Tex., pressure-maintenance plant. **V. L. Cross,** St. Louis, Okla., has been transferred to the Seminole plant as superintendent, replacing Witcher.

Robert H. Scholl, associate general counsel since 1946 for Esso Standard Oil Co., New York City, has been appointed general counsel for the company, succeeding **Edwin S. Hall,** who continues as vice president and director of the organization. Scholl joined Esso Standard in 1937 from the law firm of Kellogg, Emery & Innes-Brown. A Princeton graduate, he took his law degree from Colum-

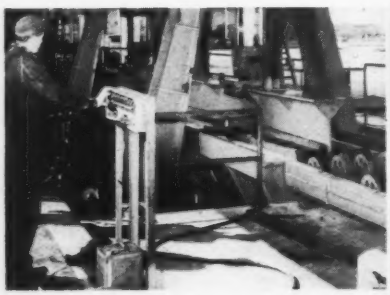


Cleaning vats for de-scaling and cleaning plates.

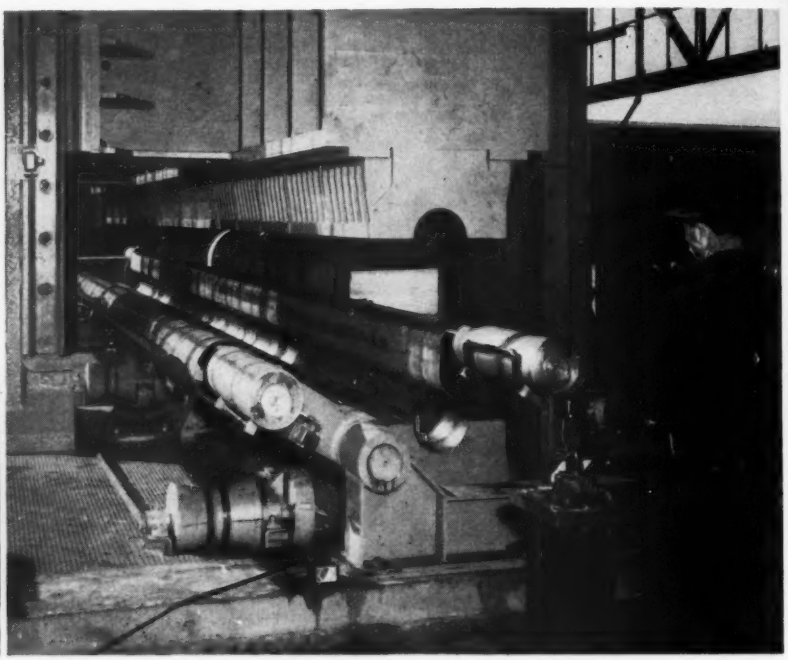


Pickled plates stacked, waiting to be started down production line.

Plate about to enter pre-forming machine.



U-ing of plate in U-ing press.

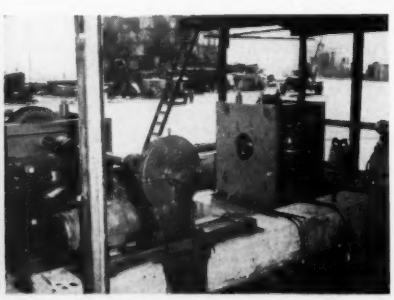


"U" on right being conveyed to press . . . formed cylinder on left leaving press.

Close-up of "U" entering and press-formed cylinder leaving main press in single operation.

Removing oil from cylinder after forming preparatory to welding.

Lengths of pipe leaving Berkeleys after being welded by submerged arc process. (Lincoln weld)



Straightening and rounding machines capable of substantial reduction by cold working.

We are continuing to operate our existing facilities for producing large diameter steel pipe . . . 24 to 36 inch rolled in 30 foot lengths with single longitudinal seam weld, and two seam pipe in larger diameters in 30 foot lengths. IMMEDIATE ATTENTION given your needs.

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Complete new 40-foot pipe making facilities on the Pacific Coast.

THE NEW BASALT STEEL PIPE PLANT is now in full operation using hydraulic press method of forming tubes 40 feet in length. The size range is 6⅝-inches O.D. to 20-inches O.D.—completely die equipped for intermediate sizes in a wide range of wall thickness. This plant is thoroughly modern—from pickling and descaling plate to cold working and re-rounding the finished pipe.

Welding is done by twin submerged arcs . . . using Lincoln process through Berkeley automatic machines. Additional welding facilities will be operating by August 1, 1949 to produce resistance welded specification pipe using the Yoder 1500 KVA Unit.

Size range with Yoder will be 6⅝-inches O.D. to 20-inches O.D. and wall thickness up to ⅜ inch. A portion of this year's fabricating capacity is still available . . . your inquiries are solicited. **STEEL PRODUCTS DIVISION, BASALT ROCK COMPANY, INC., NAPA, CALIFORNIA.**

PRODUCTION LINE METHODS
. . . permit the fabrication of large quantities of top quality pipe, rapidly and economically.

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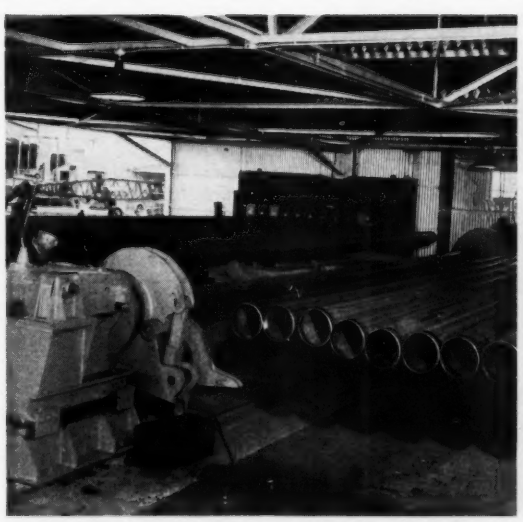
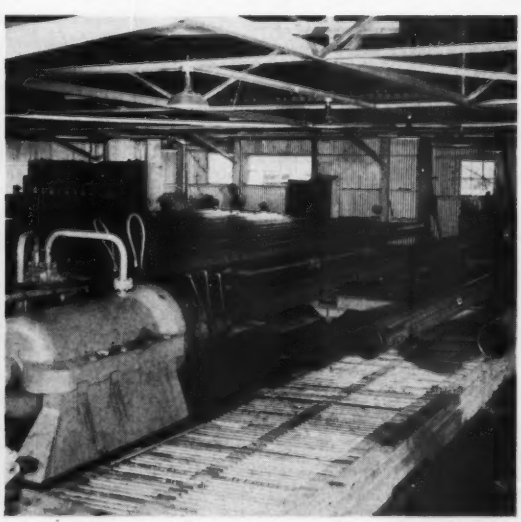


Lathe trimming and beveling both ends of 40-foot length of pipe simultaneously.



High pressure hydrostatic testing of 40-foot finished pipe.

PERSONALS

bia University in 1925, and was admitted to the New York Bar Association the following year.

H. P. Hobart, formerly vice president in charge of lubricating-oil sales for Gulf Oil Corp., and Gulf Refining Co., Pittsburgh, has been made vice president in charge of product development and product engineering, and his function will be to provide latest information on product application, in addition to rendering technical assistance to the selling force. Other changes involved in the company's new organization plan for the domestic-marketing department include the following: **R. M. Bartlett,** formerly vice president in charge of fuel-oil sales, named vice president in charge of general sales, where he will be responsible for all domestic sales of foreign crude for importation into the United States, and Canada, and sale of petroleum products in markets other than those assigned to the divisional-sales organization; **H. G. Meador,** formerly division manager at New Orleans, elected vice president, in charge of divisional sales, where he will supervise marketing of all company products through the divisional-sales organization, which operates in 33 states; **Charles J. Guzzo,** appointed manager of the New Orleans sales division of Gulf Refining Co. Guzzo was formerly assistant division manager at New Orleans.

H. P. HOBART

R. M. BARTLETT

H. G. MEADOR

C. R. Coneway, Humble Oil & Refining Co., Houston, has been named regional director, southern area, of Industrial Audio-Visual Association. He is in the employe-relations department of Humble.

C. E. Farmer, United Gas Pipe Line Co., has been named superintendent of the company's chemical department at general headquarters in Shreveport. Farmer has been with United Gas since 1931.

Alfred D. Carleton, manager of the traffic department of Standard of California and former consultant on transportation to the secretary of state, will address the midyear meeting of the National Tank Truck Carriers, Inc., in Denver on May 31.

Elton M. Hyder, Jr., assistant attorney general in charge of oil and gas litigation for the State of Texas, has resigned to take up private law practice.

J. M. Miller, drilling-equipment engineer for Humble Oil & Refining Co., has been named in charge of the drilling equipment division for the company to succeed **G. B. Kitchel,** who has resigned. Other promotions and transfers in the production department include: **H. L. Landua** and **G. F. Abenroth,** formerly petroleum engineers for Odessa and the Avery Island districts, respectively, have been transferred to the petroleum-engineering division, Houston, as supervising petroleum engineers; **A. J. Shaw,** Means district engineer, replaced Landua; and **V. E. Skalnik,** engineer at Means, succeeded Shaw.

A. M. Nixon, gas plant repairman, has been transferred from Katy gas-cycling plant to the North Crowley district as mechanical supervisor, and **Bert R. Williamson** has been named marine equipment material pusher of the marine-equipment division.

Henry Keplinger, Tulsa, of Keplinger & Wanemacher, petroleum engineers, has gone to the Middle East oil fields for a field survey, which is a joint project with Frederic R. Harris, Inc., consulting engineers, New York and San Francisco.

William H. Curry, district geologist, Atlantic Oil & Refining Co. in the Rocky Mountain area for the past 6 years, has resigned and will become vice president and director of Wy-Tex Oil Co., San Antonio, in charge of its Rocky Mountain division, with offices in Casper, Wyo.

John W. Naylor, independent oil producer, Fort Worth, and for many years oil editor of the Fort Worth Star-Telegram, has been confirmed by the Senate as a brigadier general in the U. S. National Guard.

Brig. R. S. C. Stokes, chairman of the board and director of Trinidad Leaseholds, Ltd., has resigned to take up an appointment in South Africa. **Simon J. Vos** succeeds Stokes as chairman of the board. **Roland Beaumont** has relinquished his directorship in the company and its associated companies as of March 31, on his retirement. **Maj. Kenneth Gordon** succeeds Beaumont as managing director of the company. The firm announced that **T. Muir-Warden** has been elected a director of the company.

E. B. Peterson, division credit man for Continental Oil Co., in Denver since 1929, has been appointed assistant general credit man, eastern division, in the company's general offices at Ponca City, Okla.

Lawrence (Larry) Lemons, formerly with Rinehart Oil Reports, at Jackson, Miss., has joined the land department of British-American Oil Producing Co., at Oklahoma City.

Myrl Mannschreck, landman for Mid-Continent Petroleum Corp., at Wichita Falls, Tex., has been elected secretary-treasurer of the new Wichita Falls Landmen's Association. **W. Guy Sinclair,** Gulf Oil Corp., is president, and **M. E. Hooten,** Superior Oil Co., vice president.

Clair A. Foster, formerly manager of the land department for National Cooperative Refinery Association and Bay Petroleum Corp., Wichita, has been made Kansas representative of Ramsey Petroleum Co., of Oklahoma City.

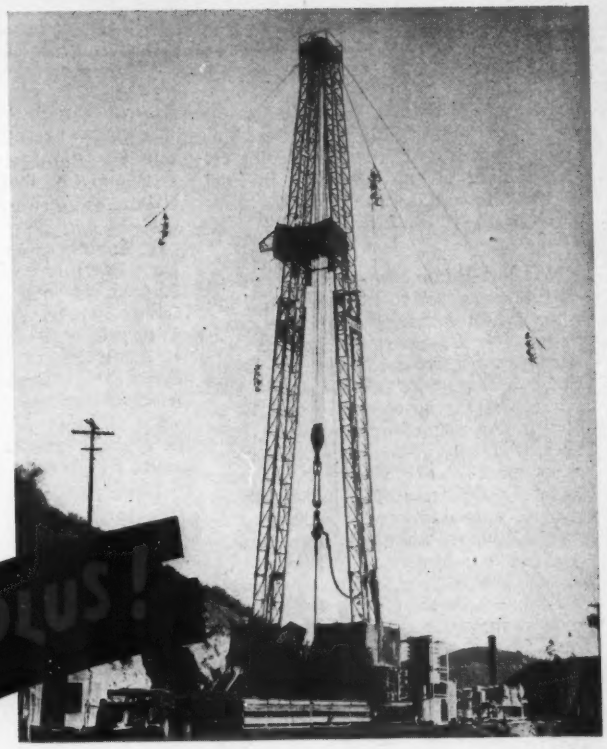
Albert L. Hall, assistant manager, Reno Oil Co., Wichita Falls, Tex., has joined Deep Rock Oil Corp. as assistant to the vice president in charge of production, **R. K. Huey.** A graduate of Oklahoma University, Hall spent 3 years with Reno Oil Co., and served as a director of Oklahoma Oil Corp., a Reno subsidiary. Previously he was with Phillips Petroleum Co. as a petroleum engineer. During the war he was with the Navy, assigned to petroleum procurement and inspection at various Gulf Coast refineries, and in Aruba and Curacao, N. W. I.

W. W. (Woody) Fisher, formerly with Stanolind Oil & Gas Co., has been named head of the land department for Petroleum, Inc., at Wichita, Kans.

Herb Officer, Oklahoma City, scout for Gulf Oil Corp., has been transferred to Casper, Wyo., and will be replaced in the Oklahoma City area by **Dick O'Connel.**

G. W. Barnett, safety engineer at Kilgore, Tex., for Shell Pipe Line Co., has been recommended to the National Safety Council for the president's medal, for heroism exercised in saving a life. He has been with the company for more than 20 years, starting on the McCamey, Tex.-Cushing, Okla., line in 1929.

WALDRIP



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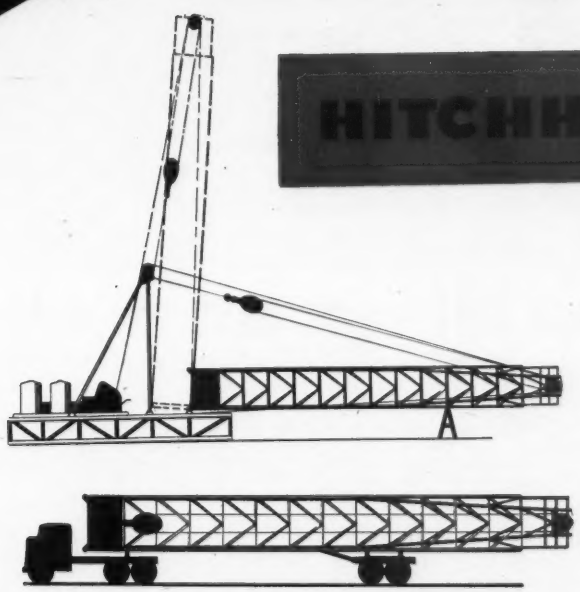

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PERSONALS

E. H. Powers, zone geologist for Gulf Oil Corp., at Midland, Tex., has been transferred to the geological department of the company, in Fort Worth. He will be succeeded at Midland by **H. Y. McClure.**

W. R. Riddle, formerly pipe-line maintenance foreman for Shell Pipe Line Co., has retired from the company after 29 years of service. He started as a mechanic in the Mid-Continent area in October 1919. Also retiring from the company are: **E. C. Morris,** former communication engineer at Houston, who served the company for 22 years; **Henry P. Haynes,** formerly station utility man at Verdi station, who had been with the company 17 years; **John W. Siler,** Healdton, Okla., station engineer, who served the firm for more than 22 years; and **B. H. Koger,** field gager at McCamey, Tex., who had been with Shell 19 years.

John Post, former manager of employe relations for Standard Brands, Inc., is now serving as manager of the newly created industrial-relations department, Continental Oil Co., in Ponca City, Okla.

SHIFTS—

Maurice Sklar, geologist, California Standard Co., Bakersfield, Calif., to Calgary, Alta., Canada; **R. E. McClintock,** superintendent, Rocky Mountain Drilling Co., Coalinga to Taft, Calif.; **Stanley E. Spurgeon,** engineer, Phillips Petroleum Co., Alvin, Tex., to Houston; **E. J. Kieth,** foreman, Continental Oil Co., Brownwood to Pampa, Tex.; **C. B. Smith, Jr.,** foreman, Continental Oil Co., Kermit, Tex., to Carlsbad, N. M.; **B. F. Patterson, Jr.,** engineer, The Texas Co., Gladwater, Tex., to Shreveport, La.; **O. V. Stuckey,** engineer, Gulf Oil Corp., Kilgore, Tex., to Harvey, La.; **Stuart D. Smith,** engineer, Shell Oil Co., Inc., Naborton to New Iberia, La.

H. Burst, III, engineer, Humble Oil & Refining Co., Grand Isle to Franklin, La.; **C. A. Langner,** engineer, Humble Oil & Refining Co., New Orleans to New Iberia, La.; **David H. Pfeiffer,** geologist, The California Co., New Orleans, La., to Denver, Colo.; **Jesse L. Bruce,** engineer, Continental Oil Co. refinery, Westlake, La., to Billings, Mont.; **A. J. Tucker,** engineer, Humble Oil & Refining Co., Westwego, La., to Houston; **G. W. Hacke,** engineer, Humble Oil & Refining Co., Westwego, La., to Freeport, Tex.; **C. M. Carothers,** engineer, Humble Oil & Refining Co., Westwego, La., to Raymondville, Tex.; **William B. Jackson,** engineer, Koppers Co., Knoxville, Tex., to Roselle, N. J.

R. C. Hartman, engineer, Socony-Vacuum Oil Co., Inc., Augusta, Kans., to Casper, Wyo.; **C. C. Irby,** superintendent, Sohio Petroleum Co., Russell, Kans., to Oklahoma City; **Ben D. Fallon,** engineer, Stanolind Oil & Gas Co., Casper, Wyo., to Tulsa; **Ed. Smigel,** engineer, Rocky Mountain Gas Co., Rawlins to Cody, Wyo.; **J. J. August,** foreman, General Petroleum Corp., Worland, Wyo., to Whittier, Calif.; **J. W. Kuhlmann, Sr.,** foreman, S. F. Hutcheson, Walters, Okla., to Boyd, Tex.; **James J. Williams,** engineer, Cities Service Oil Co., Bartlesville, Okla., to Wichita; **Ed Gribi, Jr.,** geologist, Sinclair Petroleum Co., Tulsa to Diredawa, Ethiopia.

David H. Sears, geologist, Shell Oil Co., Inc., Simi to Templeton, Calif.; **Frank T. Lloyd,** engineer, Richfield Oil Corp., Long Beach to Bakersfield, Calif.; **Peter G. Burnett,** engineer, Stanolind Oil & Gas Co., Greggton to Longview, Tex.; **King W. Massey,** engineer, Shell Oil Co., Inc., Houston, Tex., to Maplewood, La.; **Peter P. Blanda,** engineer, Kewanee Oil Co., Odessa, to Crane, Tex.; **Paul K. Landtiser,** engineer, Atlantic Refining Co., Odessa to Midland, Tex.; **H. T. Wright, Jr.,** engineer, Humble Oil & Refining Co., Pleasanton to Encino, Tex.; **Henry W. Lam,** engineer, Atlantic Refining Co., Port Arthur, Tex., to Philadelphia, Pa.; **T. S. Green,** geologist, Republic Exploration Co., San Antonio to Hebbronville, Tex.; **Charles Hornberger,** geologist, Sun Oil Co., San Antonio to Corpus Christi, Tex.

Wilton B. Brown, engineer, Western Geophysical Co., Baton Rouge, to Houma, La.; **W. L. Morgan,** engineer, The Texas Co., Shreveport to New Orleans, La.; **Thomas U. McElmurry,** engineer, Stanolind Oil & Gas Co., Batesville, Ark., to Grand Island, Neb.; **Keith Lindley,** engineer, Barnsdall Oil Co., Patmos, Ark., to Jennings, La.; **Forrest L. Carpenter,** engineer, Gulf Oil Corp., Centralia, Ill., to Tulsa; **Robert O. Mitchell,** geologist, Stanolind Oil & Gas Co., Middlesboro, Ky., to Winslow, Ariz.; **T. H. Kimmett,** engineer, The Texas Co., Norman, Okla., to New Iberia, La.

DEATHS

F. E. Webb, Wagoner, Okla., pioneer Oklahoma oil man who discovered the Wagoner and Oologah fields of Oklahoma and Mertzen field of Iron County, Texas, died March 28 in Wagoner.

Clyde Emmons Beard, 66, Tulsa drilling contractor, died March 27 in Muskogee, Okla., of injuries received in a drilling accident.

John S. Chick, 41, Tulsa, manager of production-equipment sales, Hinderliter Tool Co., died March 22 in Tulsa.

Henry C. Miller, Henderson, Tex., head of Miller Corp., died in Tyler, Tex., March 23.

R. E. Sikes, 63, Eastland, Tex., independent oil man, died March 20 in Cisco, Tex.

Lyman R. Brown, 48, research associate in technical service department, Socony-Vacuum Laboratories, Brooklyn, N. Y., died March 22.

John Hagerty Reese, 58, pumper for R. E. Smith Oil Co., Freer, Tex., died March 25 in Freer.

Henry J. Cohn, 73, veteran oil man and general manager of Sonneborn Brothers, died March 18 in Dallas.

Thomas F. Rico, Jr., 52, petroleum engineer, Richfield Oil Corp., Los Angeles, was killed March 20 in an airplane crash in the Tehachapi Mountains of California.

Chester A. Yocum, 57, purchasing agent, Western Gulf Oil Co., died March 21 in Phoenix.

Joe B. Dooley, 28, Gainesville, Tex., for a number of years an oil-field worker in North Texas, was killed in an automobile accident near Duncan, Okla., March 24.

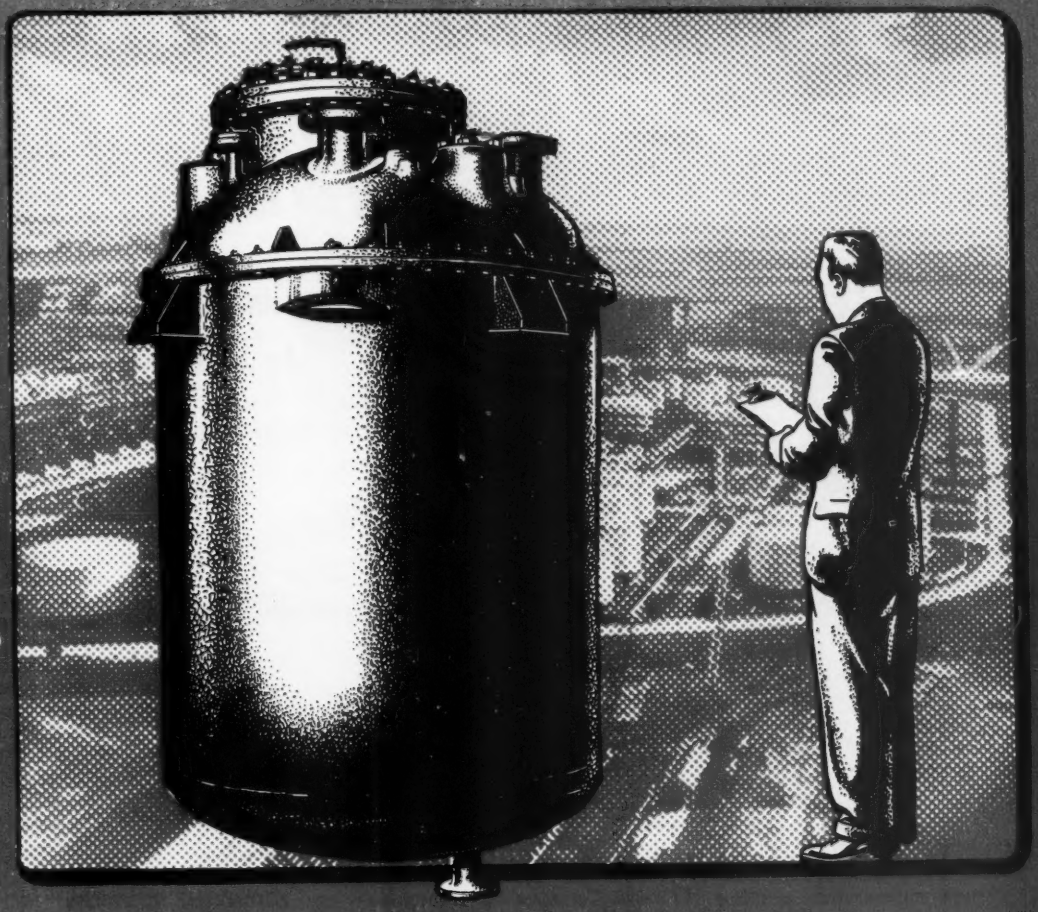
George Ward, Tulsa, veteran of more than 25 years in oil field work in Oklahoma, and one of the pioneer drillers in the early days of Red Fork, died March 25 in Tulsa.

Adam H. Herdman, 76, president and founder of Well Machinery & Supply Co., Fort Worth, died March 27 in Fort Worth.

Ross Shaw Sterling, 74, Houston, former governor of Texas, and one of the founders of Humble Oil & Refining Co., died March 25 in Houston.

Jake E. Rogers, 42, Tulsa, for a number of years with The Texas Co. in Tulsa, died March 27 at Talihina, Okla.

TO THE OIL PLANT ENGINEER



Yours the problem - Harveys the answer!

Because Harveys specialise in the fabrication of Plant for the Industrial & Chemical Trades they can supply the answer to even the most complicated Plate work problem. Modern welding equipment and an experienced staff are available for the production of installations to any of the recognised codes, including A.O.T.C., Lloyds, A.P.I. and A.S.M.E. with if necessary, X-ray examination and stress relieving by heat treatment. Harveys fabricate from mild or alloy steels, nickel and clad steel. Shop assemblies range from a few inches to 15' 0" in diameter, pressures from absolute to 3,000 lbs. per sq. in. If you have plant to be built, consult Harveys for all items of welded plate work. High grade designs can be developed from your specifications.

A typical example is the Electrically Welded Stainless Steel Autoclave, fitted with a Mild Steel Jacket, illustrated here. The inner shell has a diameter of 5' 0" and the Autoclave is 8' 5" high. This vessel was manufactured to Class 1 Specification with all welds X-rayed.

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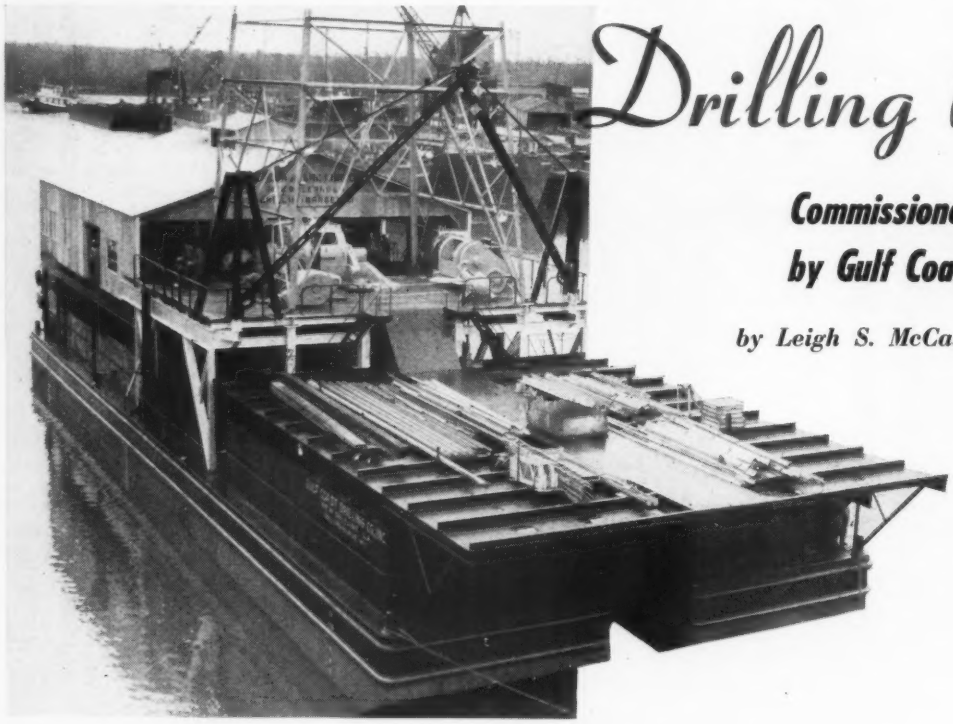
New 15,000-Ft. Submersible Drilling Barge

Commissioned at Beaumont by Gulf Coast Drilling Co.

by Leigh S. McCaslin, Jr.



Gulf Coast Drilling Co. Barge No. 1 ready for tow to its first location, Atlantic Oil & Refining Co. 1 State Lease 4204, in Northwest Bayou Carlin, St. Marys Parish, Louisiana. The barge represents an investment of from $600,000 to $700,000

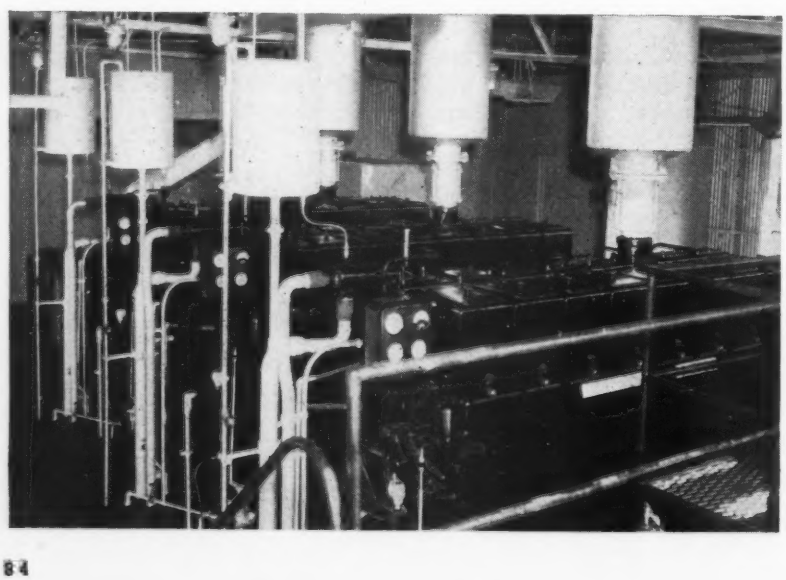
GULF COAST DRILLING CO., INC., of New Orleans, has just commissioned a new submersible drilling barge that is designed for drilling to 15,000 ft. in shallow inland waters. Cooperating with this drilling contractor, Bethlehem Steel Co. and Bethlehem Supply Co., designed, built, and assembled this new heavy-duty drilling unit.

This drilling barge of Gulf Coast Drilling Co., Inc., represents an investment of between $600,000 and $700,000. Commission ceremonies were held February 19 in Bethlehem's Beaumont yard.

Standard practice heretofore has been to build barge hulls in regular shipyards and deliver them to the owners for rigging up. In the case of the Gulf Coast No. 1, all work to final completion was done in the Beaumont yard by Bethlehem Steel Co. and Bethlehem Supply Co., a Bethlehem subsidiary in the oil-equipment field.

Keel for the Gulf Coast No. 1 was laid on October 22, 1948, and the hull, with superstructure completed, was launched on January 5. Delivery to owners was made on February 19 and the barge towed to its first location—Atlantic Oil & Refining Co. 1 State Lease 4204, in Northwest Bayou Carlin, St. Marys Parish, Louisiana. Partners in the New Orleans drilling firm—Gulf Coast Drilling Co.—are J. J. Rebstock and R. H. Reeves. (See accompanying box for brief background on Gulf Coast Drilling Co.)

Construction of a U-type barge, designed for predetermined types and sizes of drilling equipment, was the first step in the fabrication of Gulf Coast No. 1. This all-welded barge is 140 by 52 by 11 ft. in size. The hull is of longitudinal framed construction, with intermediate buck frames and is divided into various compartments forming four ballast tanks and one fresh-water tank.



These three diesel engines, which can be used singly or in combinations of two or three, furnish the power for the rigs draw works. The draw works have a rated capacity of 1,400 input horsepower

Gulf Coast Drilling Co., Inc. New Orleans

GULF COAST DRILLING CO., INC., was incorporated in July 1948. Offices of the newly organized firm are at 537 International Trade Mart, New Orleans. Officers of the firm are: J. J. Rebstock, Sr., president; Robert H. Reeves, vice president and drilling superintendent; J. J. Rebstock, Jr., secretary-treasurer and assistant drilling superintendent; Albert J. Beveridge, tool pusher.

J. J. REBSTOCK, SR.

With respect to the concern's operations, its president made this statement at the launching ceremonies of Gulf Coast Drilling Barge No. 1, "We have not done any deep-sea drilling and contemplate none in the future. While we operate several barge units, we expect this new integrated unit to be the queen of our fleet. It may be the forerunner of others of a like nature, and I certainly see the necessity for the adoption of this type of drilling barge in this area."

R. H. Reeves, vice president of Gulf Coast Drilling Co., is a pioneer in submersible barge drilling. He worked as a driller and field superintendent for The Texas Co. during the inception of this type of drilling.

Driller's position and draw works on Gulf Coast Drilling Co. Barge No. 1, which is designed for drilling to 15,000 ft. in shallow inland waters

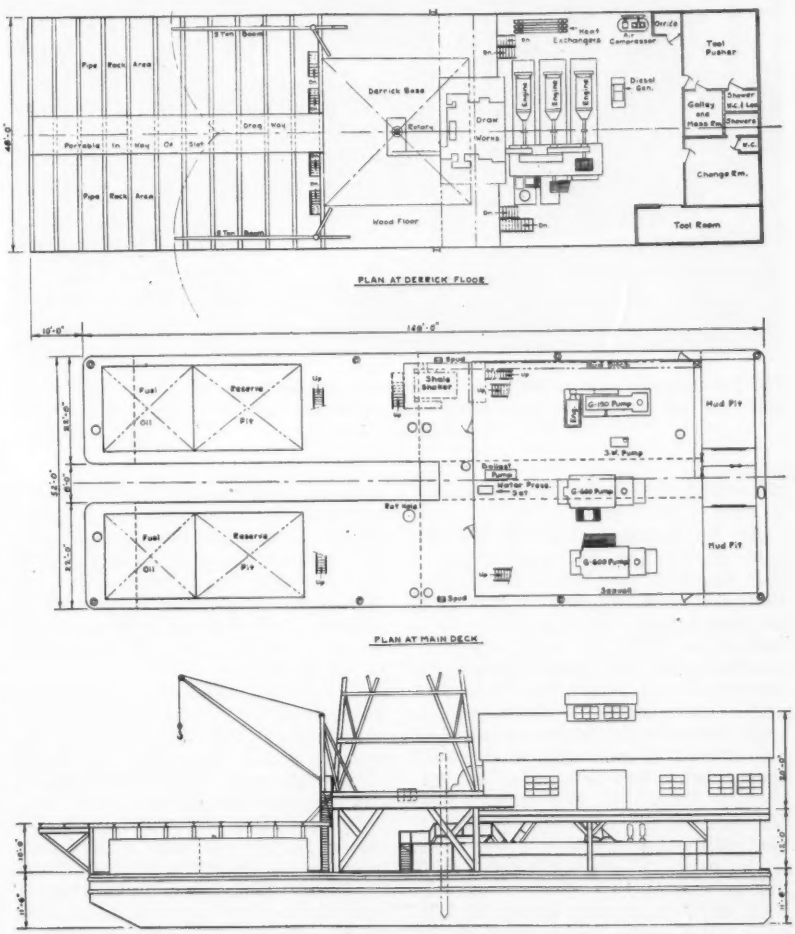
In the layout, the mud pumps are on the main deck, enclosed within a 6-ft., watertight sea wall, with access through 30-in. gates. Above the pump level, in the forward end of a 48 by 60-ft. deck house are three diesel engines which power the draw works and slush pumps. The draw works is located on the derrick substructure, 4 ft. above the prime movers.

A separate, high-capacity ballast pump of 90,000-gal.-per hour capacity is used in raising the barge. With this pump it is possible to raise the barge from fully submerged position to minimum draft in 40 minutes. In addition, the slush pumps may also be used for this purpose, independently of or in conjunction with ballast pump.

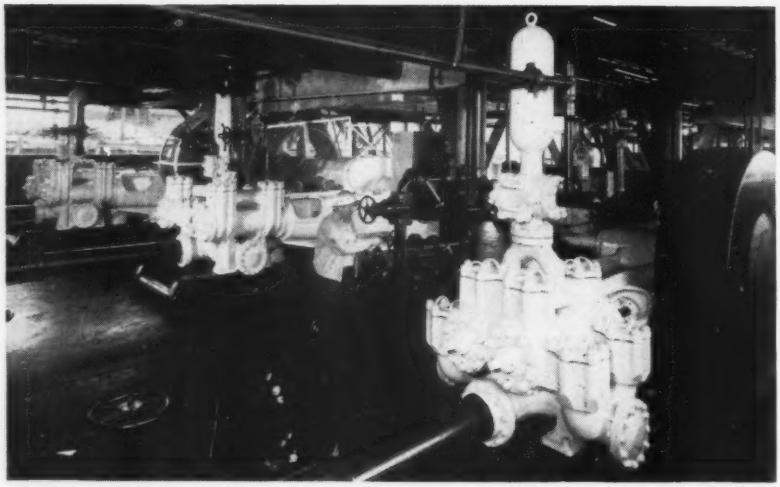
The barge's pipe rack is forward of the derrick floor, and 6 ft. below it, on both sides of the slot in the U-barge. By adding a 10-ft. overhang this rack has been made sufficiently long to accommodate range 3 casing. Over the drilling slot is an 8-ft. drag way of ½-in. plate. It is removable so as to provide full substructure clearance when the barge is moved off a well. A 6-ft. ramp runs from the pipe rack to the derrick floor. Two 5-ton derricks, with 35-ft. booms, one on each side of the derrick floor, handle the pipe.

A 10 by 10-ft. stacking board is designed for a load of 8,500 lb. per sq. ft. The rathole, made up of 20-in. diameter pipe, is fitted integrally with the hull, with an opening on the derrick floor.

Heavy wood flooring, consisting of two 3-in. layers with building paper and asphalt waterproofing between, is used around the rotary table, and



Plan and profile of the $700,000 drilling barge



The three diesel-driven slush pumps consist of two with a rating of 600 input horsepower and one rated at 150 input horsepower. The two big pumps are driven from the diesel prime movers by multiple V-belting. Small pump is used for mud mixing and mud transfer

The U-drilling slot with the two reserve mud tanks on either side of the slot. The barge's pipe rack can be seen above the reserve pits. They are sufficiently long to accommodate range 3 casing

checkered plate outboard of the draw works.

An important feature in the design of the derrick substructure is that the deck area below the derrick floor has been left entirely free from all obstructions. It is a 30 by 30-ft. truss-type structure with an 8-ft. overhang for the draw works, and is supported on heavy builtup girders and columns carried down to the bottom where the loads are dissipated in the structural members of the hull. This substructure is capable of supporting 250,000 lb. per derrick leg, plus the regular incidental loads, including the drill stem.

The barge is made of regular ABS hull steel, with ⅜-in. bottom and side shell with ⅞-in. deck plates. A 2-ft. walk, with storm rail in way of the tanks and the sea wall, runs around the entire main deck. On both sides is a full-length double fender made of extra-heavy, split 8-in. pipe, welded to the hull. Eight bitts, two at each end and two on each side, are provided for towing and mooring. Two 27-ft. spuds, one on each side, are used in anchoring. These are housed in watertight trunks and can be driven down 16 ft.

Bethlehem Supply Co. furnished all equipment for the Gulf Coast No. 1 including drilling machinery, wire rope, and all other essential items. Major equipment items contained on the barge are as follows:

Draw works.—MC-950 model with rated capacity of 1,400 input horsepower and 15,000-ft. drilling with 4½-in. o.d. drill pipe. It is powered with three diesel engines, which can be used singly or in combinations of two or three. Diesels are cooled by heat exchangers, one for each engine, using sea water supplied by centrifugal pumps capable of delivering 175 g.p.m. of cooling water to each engine.

Slush pumps.—Two Model G-600, 7¾ by 18 in. with 600 input brake horsepower, driven from any one or all of the prime movers by multiple V-belting. One Model G-150, 7 by 14-in. slush pump is used as a mud-mixing and mud-transfer pump. Pump has an input horsepower rating of 150 and is powered by a diesel engine.

Rotary table.—Model B-21-S with 21-in. opening, rated capacity of 16,000 ft. with 4½-in. o.d. drill pipe, and a recommended maximum speed of 300 r.p.m. This is a new model introduced only a few months ago.

Hoisting equipment.—Model A-350, six-sheave crown block, and a five-sheave companion traveling block with 350 tons capacity. A Model 300-T swivel with rated capacity of 300 tons at 100 r.p.m. A 1⅜-in. diameter, 6 by 19, special rotary drilling line. Coring reel with capacity of 15,000 ft. of ⅝-in. diameter line and individually driven by a diesel engine.

Derrick and substructure.—A 136-ft.-high derrick with a 30-ft. square base, load capacity of 1,100,000 lb. and designed to withstand winds up to 125 m.p.h. In the design of the derrick substructure, the deck area below the derrick floor has been left entirely free from obstruction. It is a 30 by 30-ft. truss-type structure with an 8-ft. overhang for the draw works. It is capable of supporting 250,000 lb. per derrick leg, plus the regular incidental loads, including the drill stem. All columns and girders in the derrick substructure are metallized with a heavy coating of zinc for corrosion protection. This is designed to prevent warping or weakening as may occur when hot-dip galvanizing is used.

Fuel-oil tanks.—Two 15,000-gal. tanks providing sufficient fuel for 2 months' normal operation. Transfer pump of 50-g.p.m. capacity is used to pump oil from the main tanks to two 750-gal. day tanks on the derrick-floor level.

Auxiliary equipment.—Electric power is supplied by a 60-kw. 115/230 volt, diesel-driven, d.c. **generator** located in the engine compartment. **Compressor** of 30 cu. ft. capacity, driven by a 10-hp. motor, delivers air of 200-psi. pressure. Water for washdown and general use is supplied by 2½-in. **centrifugal pump** driven by a 10-hp. motor. Fresh water is handled by a 5 by 10 reciprocating, 180 g.p.m., **high-pressure pump** driven off the engine compound. Other equipment driven through the engine compound includes a standby 25-kw. **generator** and a 100-psi. **compressor.**

Mud System

As previously mentioned, the three

slush pumps consist of two rated at 600 input horsepower and one rated at 150 input horsepower. Extra-large space is provided for active mud pits and reserve pits. The two active pits, with connecting sluice gate, are 11 by 22 by 5 ft. and 11 by 26 by 5 ft. with respective capacities of 215 and 255 bbl. The pits are an integral part of the barge and located aft. Above the pits are two large 11 by 18 by 9-ft. mud houses, with sliding doors. A portable subway grating is in place over the mud pits, between the two houses.

The two reserve tanks, each 17½ by 22½ by 7 ft., hold 491 bbl. and are located forward, one on each side of the drilling slot. Water for the mud system is delivered from the fresh-water tank by a reciprocating, high-pressure pump with a capacity of 180 g.p.m. and driven from the main engine compound.

Engine House, Quarters, Etc.

The engine house is of steel framing with corrugated steel sidings. Two overhead hollow-metal doors, 10 ft. wide by 8 ft. high, allow ample space for handling heavy machinery in and out of the house. A monitor roof with projected steel sash provides natural ventilation.

The quarters have been laid out to insure maximum comfort and convenience for the crew. They include a tool pusher's room, with four bunks with inner-spring mattresses; office; galley; shower and toilet compartments, and they are separated from the machinery space by a bulkhead of 1-in. car siding. Plywood, ⅝-in. thick, is used for covering the wooden partitions and the overhead, and the walls and ceilings enclosing the quarters are insulated with a 4-in. thickness of fiber glass. A 30-in. attic-type fan, installed above the quarters, draws air through automatic-type shutters from the galley and the tool pusher's room.

The galley is equipped with sink and cabinets of stainless steel, stove, and refrigerator. Portable water is delivered by gravity flow from a 900-gal. tank installed between the roof trusses of the house and supported on stanchions located within the partitions.

History and Development of Swamp And Marsh Drilling Operations

*by J. C. Posgate**

DRILLING procedures and equipment adaptable to marsh and swamp locations have been developed for the most part during the past 23 or 24 years, or since initial use of modern geophysical prospecting methods. Initial significant oil production in southern Louisiana occurred as the result of discovery of Jennings field in August 1901 by W. Scott Heywood, one of the early wildcatters. It was as the result of this and the previous Spindletop discovery in the same year that the commercial importance that salt domes were to play in the production of oil and gas dates.

However, the need for swamp-drilling equipment by the early operators was not great as is evidenced by the fact that from 1901 to 1923 only eight salt domes were discovered. These pregeophysics discoveries resulted either from surface indications or normal drilling from dry land. With the advent of geophysics vast areas of marsh and swamp became more readily prospective though not without difficulties to the operating crews. As a consequence, during the next 5 years, from 1923 to 1928, 28 salt domes were located and discoveries have continued at a rapid rate to the present.

J. C. POSGATE

Incident to this extensive discovery of salt-dome prospects, both on dry land as well as to a great extent in marsh, swamp, and the shallow open water of bays and lakes, a variety of marine structures to support rotary drilling equipment were devised and in some instances developed to a high degree of perfection. The development of this versatile equipment thus permitted prospecting the extensive coastal area of Louisiana.

The development of marine-drilling structures has not resulted in the adoption of a single type to the exclusion of all others previously used, but rather in the adaptation of a number of markedly different types, though the submergible barge rig might be considered the most significant, to suit the particular conditions encountered. In general, the foundations used for drilling rigs may be classified under the following types.

The wood-matting location not infrequently surrounded by an earthen dyke to exclude flood waters is one type.

A second type of structure long in use and still used in some instances consists of a piling structure capped by a wood floor of sufficient area to support all equipment necessary to drilling a well. The poor success experienced with piling-type structure in Bayou des Glaise field of Louisiana due to periodic inundation by flood waters and soil erosion around locations led to the development of the combination pile or artificial earthen island and floating power barge rig. In this type of rig foundation the power equipment, either boilers or electric-distribution system, and the hydraulic system consisting of mud pump and tanks are placed on floating steel barges moored to the artificial island. The earthen island is constructed to a height sufficient to prevent flooding during high water with piling being driven in the load-carrying areas to support the derrick and pipe racks. Latterly, large enough islands have been constructed to permit multiple wells to be drilled from the single island by directional drilling methods.

The high expense of piling foundations and the difficulty of transporting the rig equipment led to the development of the barge rig in 1931. The earliest barge rigs were erected on floating barges but their instability resulting from the use of continually heavier equipment necessary for deeper and deeper drilling resulted in the adoption of the submersible barge. The first such rig was constructed on a single barge designed with a slot to permit drilling below the center of the derrick. Subsequent barge rigs consisted of two drilling barges about 120 by 24 ft. supporting the derrick and draw works. These barges were positioned about 8 ft. apart to permit drilling and the location of the well head. The power barge containing either boilers or diesel-electric equipment consisted of a single barge which on location is submerged a short distance from the drilling barge and connected to it by a "catwalk."

Little has been said about the multitude of problems incident to the development of marine-type rigs for use in the coastal areas of Louisiana. In addition to the problem of developing ever more eficient equipment used in the search for oil now being conducted below 16,000 ft., there are the accompanying problems of handling production from wells, feeding and housing personnel, and transporting all material and manpower through the endless swamp and marsh areas. To touch briefly, large dredge boats for dredging canals are used. Excellent quarters are provided for drilling personnel aboard quarterboats, while housing for families has been provided where possible in attractive camps.

*Division petroleum engineer, Louisiana division, Humble Oil & Refining Co., New Orleans.

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5—Summarization Statement on:

GAS INJECTION

*by Dr. Morris Muskat**

THE basic physical picture underlying gas-injection operations for pressure maintenance and increased ultimate recovery may be considered as fairly well established. It is clear that the injection of gas into a reservoir will replace fluid withdrawals to the extent that such injected gas at least temporarily remains in the reservoir and thus serves to retard the decline in pressure. This gas also provides additional energy for expelling the reservoir oil and thereby tends to increase the total oil recovery. The detailed dynamical description of the physical processes associated with gas injection is, however, in a somewhat unsatisfactory state because of the simplifying idealizations which have to be introduced.

A basic advance has indeed been made in recent years in extending the theoretical treatment of gas-injection operations beyond the original gross description by application of the material balance equation. The latter provided means for predicting the relationship between reservoir pressure and cumulative recovery, or conversely, under gas-injection operations, but in terms of assumed future histories of the gas-oil ratio associated with the producing operations. While experience provided some guide with respect to the assumed gas-oil ratio performance, the latter nevertheless remained a basic unknown.

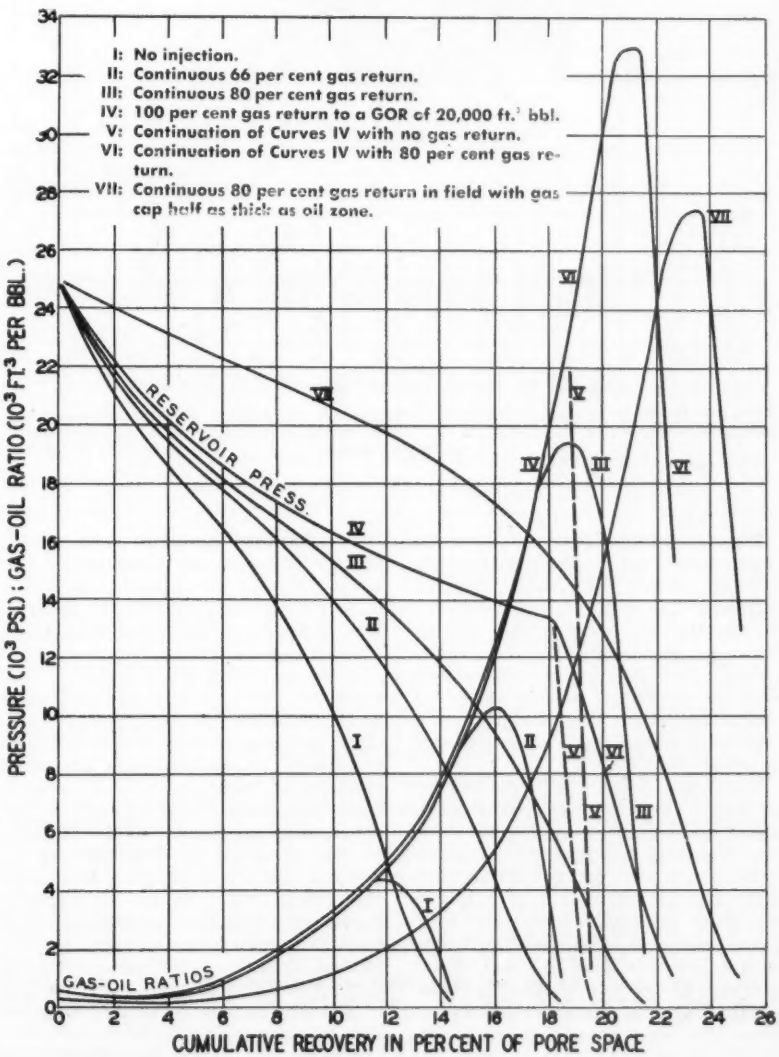
Unknown Gap Closed

Since an understanding has been developed of the physical significance of the permeability-saturation characteristics of reservoir rocks, it has become clear that they provide automatically the controlling factor in determining the gas-oil ratio associated with any state of reservoir depletion and pressure of gas-drive systems. This basic observation, while originally applied to the theoretical study of solution-gas-drive reservoirs, was readily extended to gas-injection operations, thus closing the unknown gap in the simple application of material-balance equations with respect to the magnitude of the gas-oil ratio. In a formal sense the theory of reservoir performance under gas injection may be thus considered as complete, provided the relevent empirical data on the reservoir and rock characteristics are known.

There is one fundamental feature, however, with respect to this situation that must be clearly recognized. This is the necessity for making explicit assumptions regarding the distribution and disposition of the injected gas within the reservoir after leaving the injection-well bores. This constitutes a dynamical problem which has thus far remained essentially intractable. It has therefore been necessary to assume the nature of the gas distribution in extremely simplified forms, even though an insistence on the strict validity of the assumptions would be entirely indefensible.

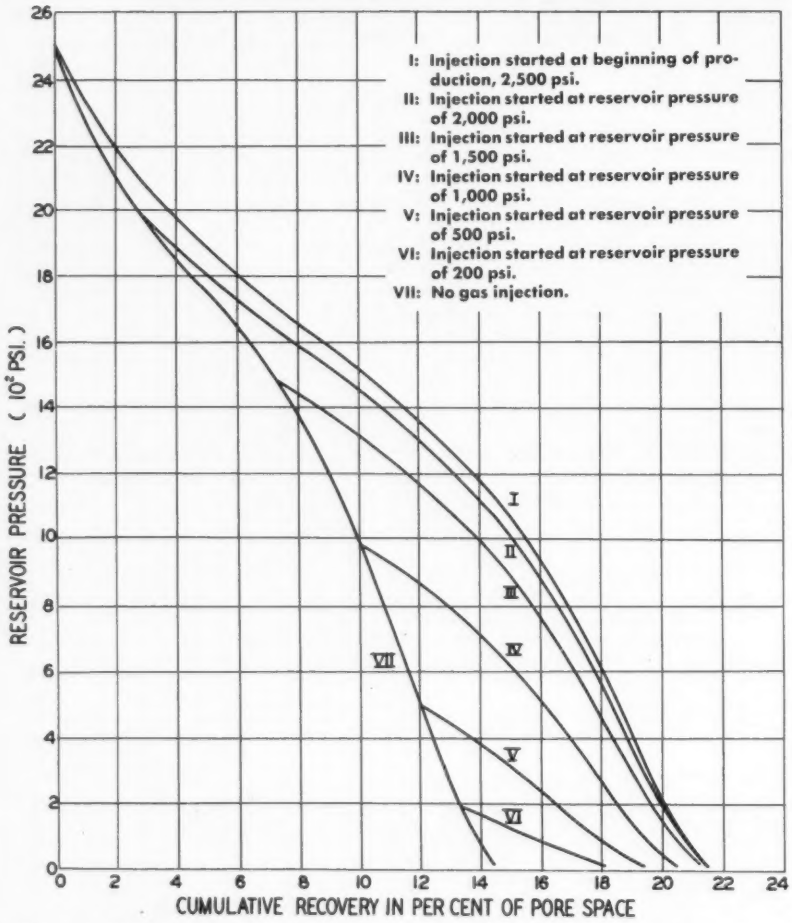
These assumptions have been primarily of two types. In the first, complete uniformity of dissemination of the injected gas and commingling with the previously developed free gas phase is assumed. In the second, complete segregation of the injected gas is assumed with no direct dissemination through the oil productive zone. The practical significance of these limiting assumptions has been rationalized by considering the former to approximate conditions of complete reservoir uniformity without any effect whatever of structure.

THEORETICAL PRESSURE AND GAS-OIL-RATIO HISTORIES OF GAS-DRIVE RESERVOIRS SUBJECTED TO VARIOUS DISTRIBUTED GAS-INJECTION PROGRAMS



*Gulf Research & Development Co., Pittsburgh.

THEORETICAL PRESSURE HISTORIES FOR 80 PER CENT DISTRIBUTED GAS-RETURN OPERATIONS IN GAS-DRIVE FIELDS, FOR VARIOUS STARTING RESERVOIR PRESSURES



(With this series of articles on reservoir engineering, Dr. Muskat presents a number of important relationships in graphic form. These specific diagrams have not previously appeared in print.)

The second idealized condition has been considered as approximating situations where structural controls dominate the reservoir performance to the extent that perfect gravity drainage and segregation is maintained throughout the operations. Without entering further into the validity of these approximations, the case of no gravity segregation will be reviewed here.

The basic differential equation describing the reservoir performance under gas-injection operations, with the indicated assumptions, is essentially similar to that governing complete pressure depletion of solution-gas-drive reservoirs. The only additional elements relate to the degree of gas injection and the size of the gas cap, if any is present. The solution of this generalized equation then gives the variation of the mean reservoir pressure with the average oil saturation in the oil productive area. By translating the latter into equivalent recoveries, the pressure vs. recovery history is obtained. The application of the permeability saturation characteristics of the rock provides the gas-oil-ratio history.

It is so found that, as is to be expected, the injection of gas leads to a retarding of the pressure decline so that if the operations be continued to a fixed pressure the cumulative recovery will be materially increased. This increase in recovery becomes greater as the amount of gas returned or injected is increased. At the same time, however, the gas-oil ratio of the production grows as depletion continues, and rises to greater values under gas injection than if depletion operations were being conducted. This merely reflects the greater reduction in reservoir oil saturation associated with the increased cumulative recoveries.

If the gas-injection operations are terminated or greatly reduced the pressure will decline sharply due to the rapid depletion of the reservoir gas resulting from high gas permeability associated with the reduced oil saturation. Thus, it is found, for certain assumed reservoir characteristics, that if 60 per cent of the produced gas be continually returned to the formation, the increase in recovery over complete depletion would be 29 per cent; whereas if 80 per cent of the produced gas be injected, the increased recovery is 50 per cent.

On the other hand, while under complete pressure depletion the maximum gas-oil ratio would be 4,400 cu. ft. per barrel, it will rise to 10,350 cu. ft. per barrel for 60 per cent gas-return operations, and to 19,500 cu. ft. per barrel for 80 per cent gas return. The average gas-oil ratios would then correspondingly rise from 1,970 cu. ft. per barrel for pressure depletion, to 3,858 cu. ft. per barrel for 60 per cent gas return, and 6,609 cu. ft. per barrel for 80 per cent return. Calculations for other cases with somewhat different conditions show substantially the same order of magnitude.

Not Applicable in Practice

Such calculations, which refer to operations in which gas injection is started immediately on bringing the field into production, will seldom apply in practice. In actual field development the question arises as to the urgency of undertaking gas-injection operations at any particular time. This can be evaluated theoretically, and under the above-mentioned simplifying assumptions, by computing the ultimate recoveries and performance as functions of the state of depletion at which the gas-return operations begin. A study of this kind shows that the exact time of beginning such operations is not of great importance from the recovery standpoint, in the range of reservoir pressures that are still of the order of or greater than half of the original pressure. Of course, there may be many other practical factors making desirable and necessary early beginning.

Field experience in gas injection serves to show that there are no simple and universal rules governing such operations. Both "good" and "bad" projects have been reported. Under favorable conditions gas injection can lead to very substantial profit returns. This does not mean that pressure maintenance by gas injection should be undertaken under any and all conditions. There are situations where gas injection will at best only retard efficient recovery, and in others where it may be entirely unnecessary for efficient recovery. The theoretical potentialities of gas injection per se are of little significance except when evaluated specifically with respect to individual reservoirs in the light of their unique and peculiar characteristics.

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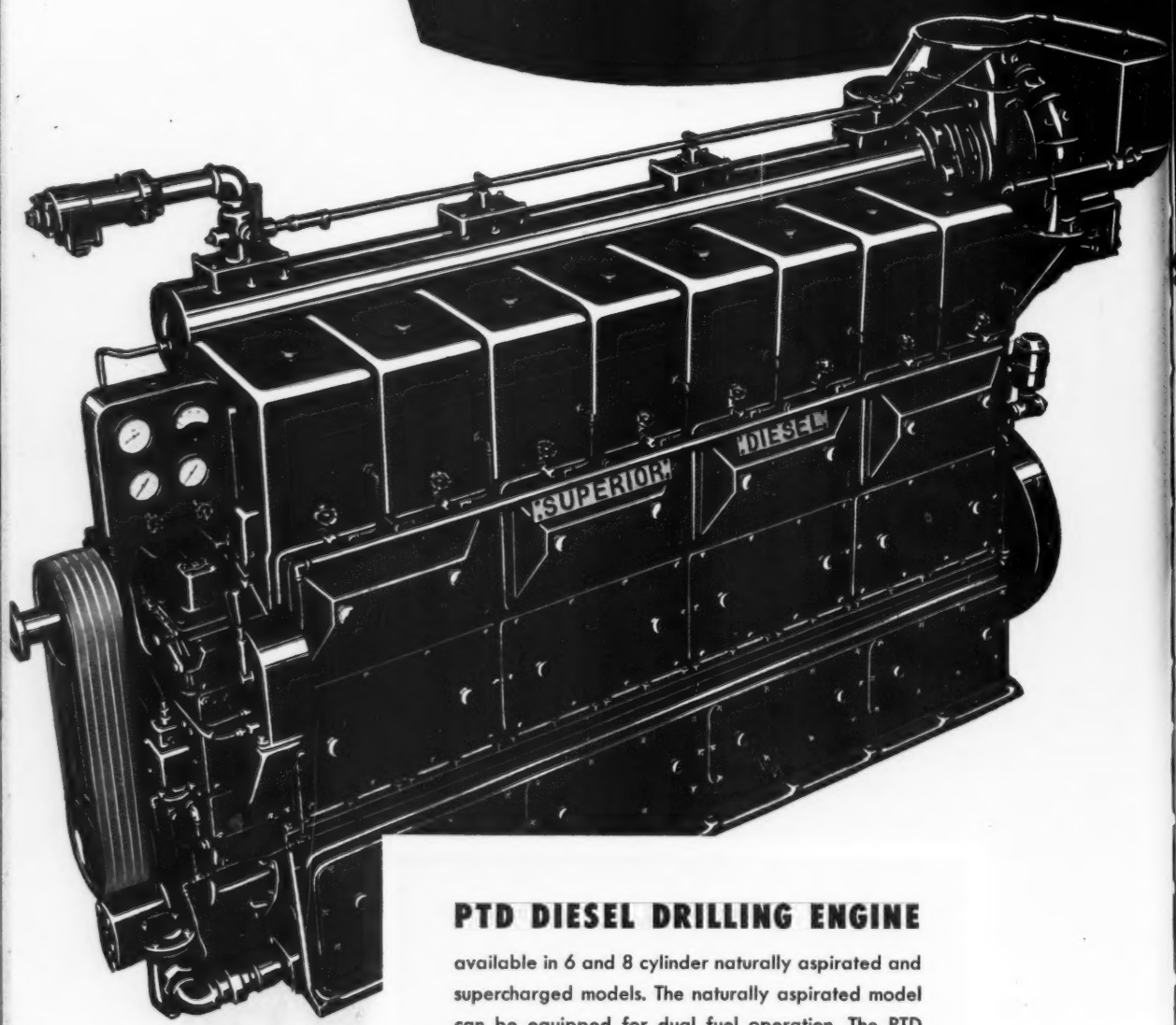

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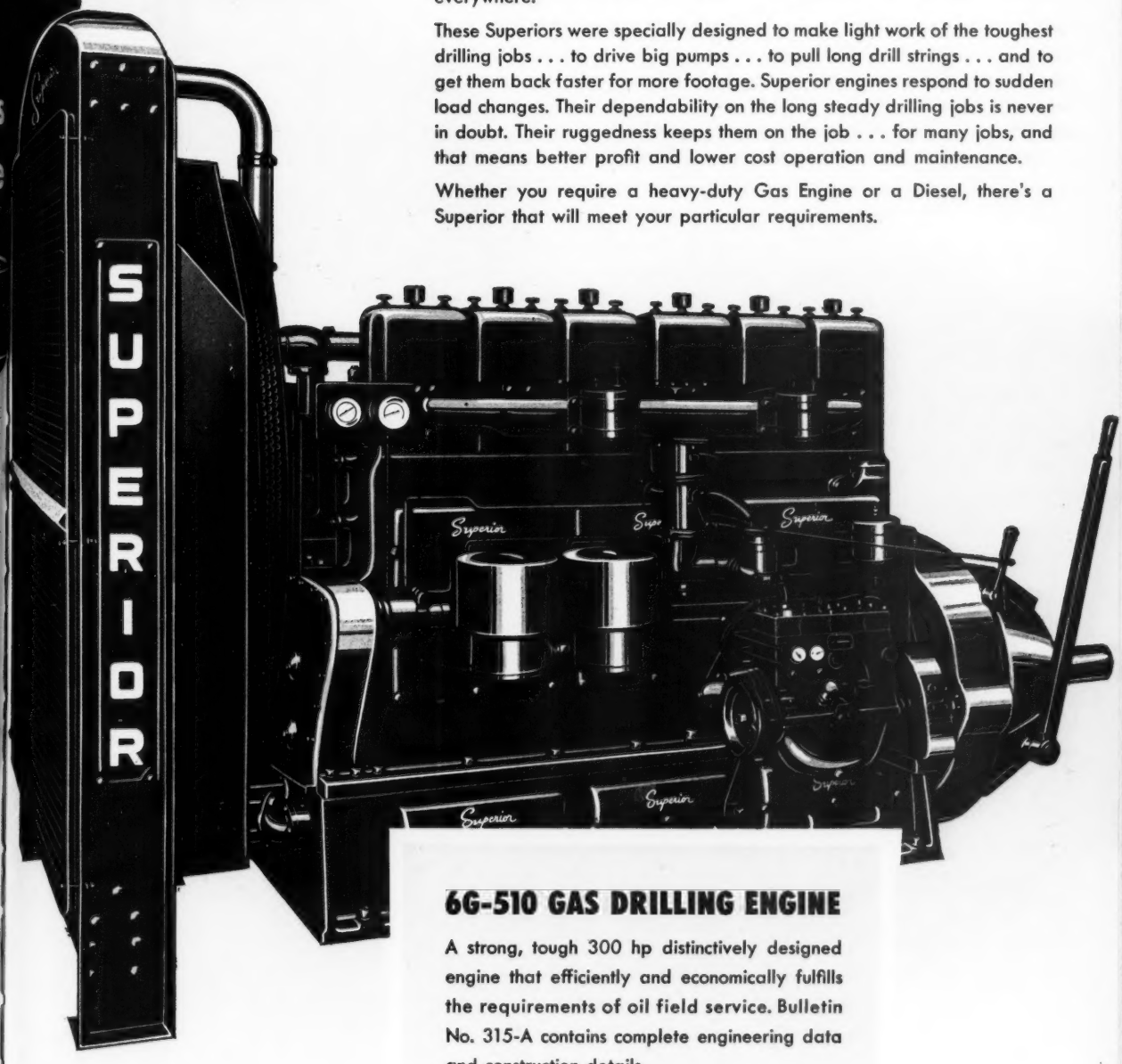

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Additional Data on

SULFUR IN CRUDE OILS

*by O. C. Blade**

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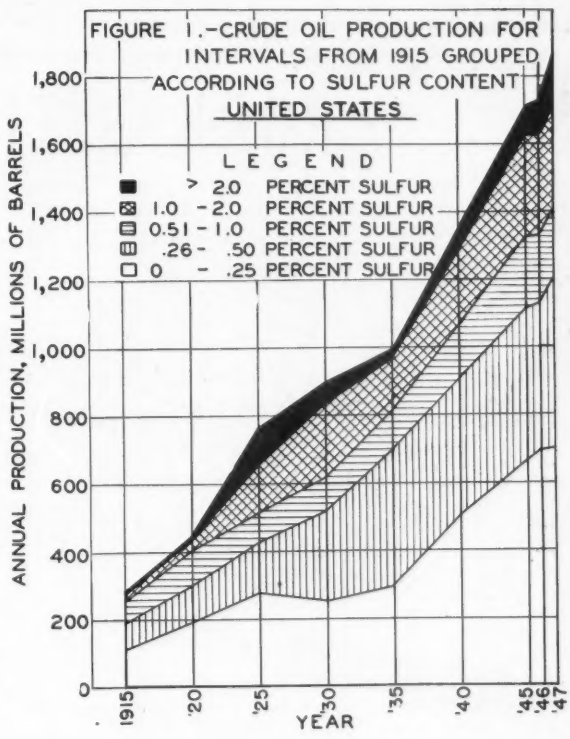
In general, the increase in production of crude oils having over 0.5 per cent sulfur content has been gradual but definite since 1935. The proportion of high to low-sulfur crude-oil production has increased from 0.49 in 1940 to 0.54 in 1945 and 1946 to 0.57 in 1947.

The five different curves plotted in Fig. 1 represent per cent values on sulfur content of U. S. produced crudes. Range on the crudes in the low-sulfur group is from 0 to ¼ per cent and for the highest group over 2 per cent. Maximum range of the second curve is ½ per cent, the third 1 per cent, and the fourth 2 per cent.



PER CENT SULFUR CONTENT IN UNITED STATES CRUDE-OIL PRODUCTION

(Millions of barrels)

District—	Year	U. S.	0-.25	.26-.50	.51-1.0	1.01-2	>2	Total
California	1945	19.05	20.1	65.1	102.1	117.1	22.1	326.5
	1946	18.18	27.9	58.3	86.5	122.4	20.0	315.1
	1947	18.06	25.0	71.4	84.8	131.6	23.8	336.6
Rocky Mountain	1945	2.93	18.3	.4	8.4	8.2	14.8	50.1
	1946	3.44	14.2	.7	14.9	9.9	19.9	59.6
	1947	3.94	13.4	....	19.7	16.9	19.6	69.6
Gulf Coast	1945	23.85	374.9	33.4	.5	....	....	408.8
	1946	23.65	385.6	23.5	.8	....	....	409.9
	1947	24.18	420.0	28.9	1.8	....	....	450.7
West Texas-New Mexico	1945	12.40	12.5	10.3	19.5	152.1	18.2	212.6
	1946	13.19	27.5	16.9	21.3	144.8	18.2	228.7
	1947	14.18	40.5	25.8	23.4	122.4	50.3	262.4
Mid-Continent	1945	33.03	148.2	306.3	58.6	21.0	31.8	565.9
	1946	32.42	144.7	296.2	63.6	21.5	36.0	562.0
	1947	31.44	109.3	333.7	58.3	39.9	44.7	585.9
Ill., Ind., W. Ky.	1945	5.18	60.8	27.9	.1	....	....	88.8
	1946	5.26	61.0	30.1	.1	....	....	91.2
	1947	4.32	54.7	25.7	....	....	....	80.4
Michigan-Lima	1945	1.02	2.1	6.9	8.5	....	....	17.5
	1946	1.00	1.6	7.1	8.5	....	....	17.3
	1947	.88	1.7	4.9	9.8	....	....	16.4
Southeastern	1945	1.13	2.4	....	11.5	....	5.4	19.3
	1946	1.42	4.9	.1	11.1	....	8.6	24.6
	1947	1.92	8.9	....	13.2	....	13.7	35.8
Appalachian	1945	1.41	24.2	....	....	....	....	24.2
	1946	1.44	25.0	....	....	....	....	25.0
	1947	1.38	25.6	....	....	....	....	25.6
Total United States	1945	100.00	663.5	450.3	209.2	298.4	92.3	1,713.7
	1946	100.00	692.4	432.9	206.8	298.6	102.7	1,733.4
	1947	100.00	699.1	490.4	211.0	310.8	152.1	1,863.4

Note: 1947 data subject to revision.

*Chief chemist, U. S. Bureau of Mines, Bartlesville, Okla.

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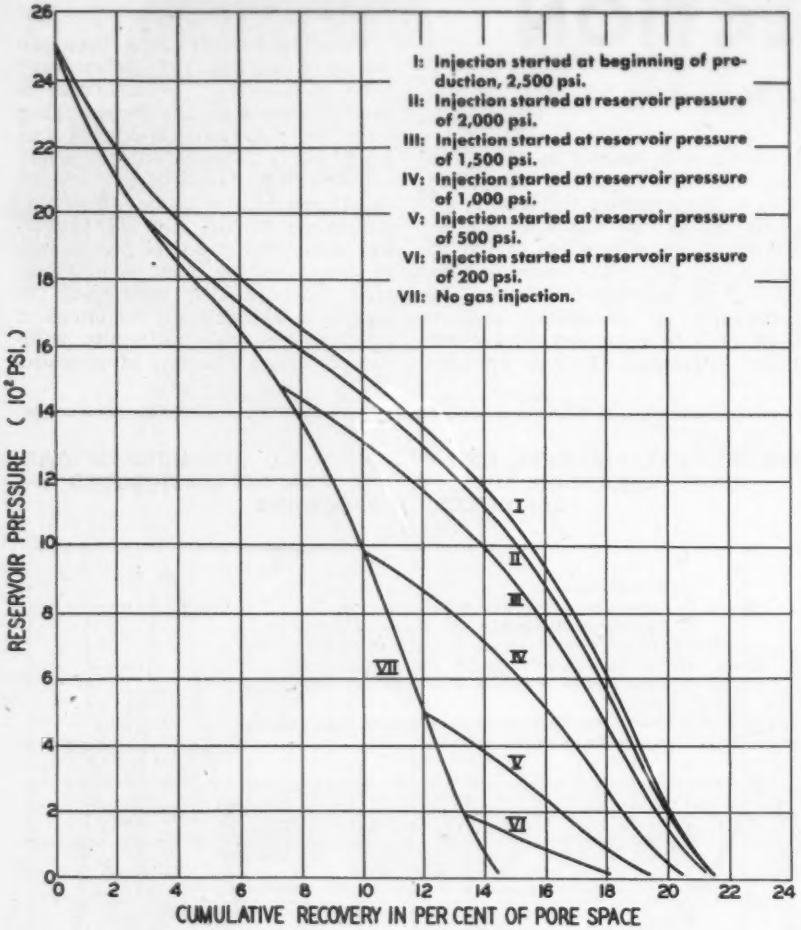
THEORETICAL PRESSURE HISTORIES FOR 80 PER CENT DISTRIBUTED GAS-RETURN OPERATIONS IN GAS-DRIVE FIELDS, FOR VARIOUS STARTING RESERVOIR PRESSURES



(With this series of articles on reservoir engineering, Dr. Muskat presents a number of important relationships in graphic form. These specific diagrams have not previously appeared in print.)

The second idealized condition has been considered as approximating situations where structural controls dominate the reservoir performance to the extent that perfect gravity drainage and segregation is maintained throughout the operations. Without entering further into the validity of these approximations, the case of no gravity segregation will be reviewed here.

The basic differential equation describing the reservoir performance under gas-injection operations, with the indicated assumptions, is essentially similar to that governing complete pressure depletion of solution-gas-drive reservoirs. The only additional elements relate to the degree of gas injection and the size of the gas cap, if any is present. The solution of this generalized equation then gives the variation of the mean reservoir pressure with the average oil saturation in the oil productive area. By translating the latter into equivalent recoveries, the pressure vs. recovery history is obtained. The application of the permeability saturation characteristics of the rock provides the gas-oil-ratio history.

It is so found that, as is to be expected, the injection of gas leads to a retarding of the pressure decline so that if the operations be continued to a fixed pressure the cumulative recovery will be materially increased. This increase in recovery becomes greater as the amount of gas returned or injected is increased. At the same time, however, the gas-oil ratio of the production grows as depletion continues, and rises to greater values under gas injection than if depletion operations were being conducted. This merely reflects the greater reduction in reservoir oil saturation associated with the increased cumulative recoveries.

If the gas-injection operations are terminated or greatly reduced the pressure will decline sharply due to the rapid depletion of the reservoir gas resulting from high gas permeability associated with the reduced oil saturation. Thus, it is found, for certain assumed reservoir characteristics, that if 60 per cent of the produced gas be continually returned to the formation, the increase in recovery over complete depletion would be 29 per cent; whereas if 80 per cent of the produced gas be injected, the increased recovery is 50 per cent.

On the other hand, while under complete pressure depletion the maximum gas-oil ratio would be 4,400 cu. ft. per barrel, it will rise to 10,350 cu. ft. per barrel for 60 per cent gas-return operations, and to 19,500 cu. ft. per barrel for 80 per cent gas return. The average gas-oil ratios would then correspondingly rise from 1,970 cu. ft. per barrel for pressure depletion, to 3,858 cu. ft. per barrel for 60 per cent gas return, and 6,609 cu. ft. per barrel for 80 per cent return. Calculations for other cases with somewhat different conditions show substantially the same order of magnitude.

Not Applicable in Practice

Such calculations, which refer to operations in which gas injection is started immediately on bringing the field into production, will seldom apply in practice. In actual field development the question arises as to the urgency of undertaking gas-injection operations at any particular time. This can be evaluated theoretically, and under the above-mentioned simplifying assumptions, by computing the ultimate recoveries and performance as functions of the state of depletion at which the gas-return operations begin. A study of this kind shows that the exact time of beginning such operations is not of great importance from the recovery standpoint, in the range of reservoir pressures that are still of the order of or greater than half of the original pressure. Of course, there may be many other practical factors making desirable and necessary early beginning.

Field experience in gas injection serves to show that there are no simple and universal rules governing such operations. Both "good" and "bad" projects have been reported. Under favorable conditions gas injection can lead to very substantial profit returns. This does not mean that pressure maintenance by gas injection should be undertaken under any and all conditions. There are situations where gas injection will at best only retard efficient recovery, and in others where it may be entirely unnecessary for efficient recovery. The theoretical potentialities of gas injection per se are of little significance except when evaluated specifically with respect to individual reservoirs in the light of their unique and peculiar characteristics.

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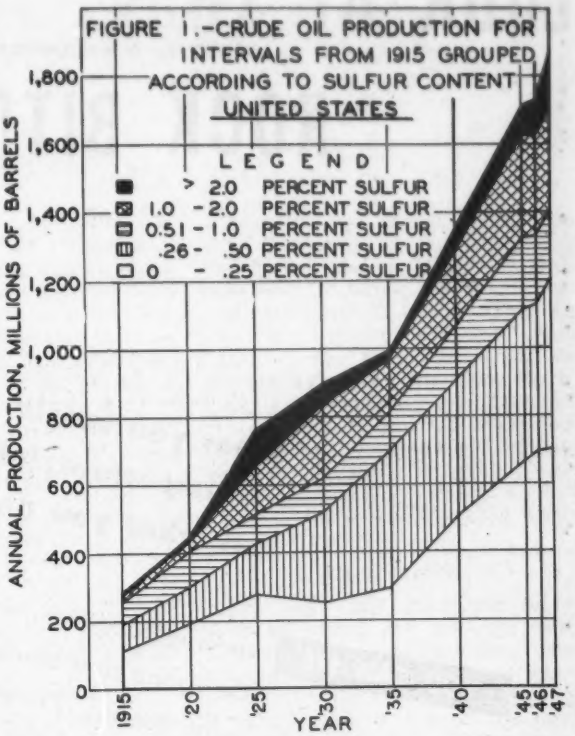

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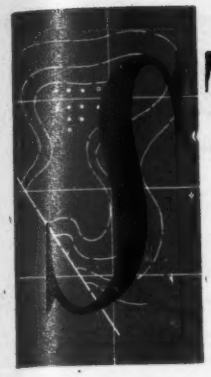


STRUCTURES OF THE San Juan Basin

*by Frank C. Barnes**

THE discovery of a new Pennsylvanian oil and gas field on the Dove Creek anticline near Cortez, Colo., has again focused attention on the San Juan basin of Colorado-New Mexico. This already lively area will undoubtedly reach a new height of leasing, exploration, and drilling activity during 1949. Inclement weather has slowed operations for the winter, but spring and summer will activate the basin in what may be a new record of oil exploration for this area.

In view of the ever-increasing interest, the author has prepared a series of maps, charts, and tables to serve as a guide for those interested in the oil activity within the San Juan basin. In a previous article, published in the May 27, 1948, issue of The Oil and Gas Journal, the author summarized the general geology and the oil and gas fields of the basin. The present report is intended to present additional data and includes information on the majority of the known structures within the San Juan basin.

Development and Activity

Briefly noted, the San Juan basin has produced commercial oil and gas since 1911. The initial oil and gas discoveries were from rocks of Upper Cretaceous age. Pennsylvanian oil production was obtained at Rattlesnake field during 1929 and commercial Pennsylvanian gas was found at Barker Creek dome at a later date. Both of these discoveries were in New Mexico. The discovery of gas and 65°-gravity oil in the Pennsylvanian at Dove Creek anticline constitutes the first Pennsylvanian oil production for the Colorado portion of the basin, but the third Pennsylvanian discovery for the basin as a whole.

During 1948, a total of 15 geophysical crews, representing 14 companies, worked within the San Juan basin, and in addition, there were more than 20 geological field parties. Forty-one wells were drilled and 21 of these were wildcats, of which 6 were successful. The Byrd-Frost 1 Driscoll in 8-38n-19w, Montezuma County, Colorado, produced gas and distillate from the Paradox formation and may represent a new Pennsylvanian field on the Dove Creek anticline. There was a second discovery on the northwest fringe of the basin where 42°-gravity oil was discovered in the Coconino sandstone (Permian) and gas in the Pennsylvanian, at Boundary Butte, Utah, in 43s-22e. *(Editor's note—These Colorado and Utah discoveries are also discussed in The Oil and Gas Journal, issues of November 4, 1948, page 133; and December 9, 1948, page 137.)* This is the first commercial Permian oil in the area and may have far-reaching significance for other nearby areas.

*Geologist, New Mexico Oil Conservation Commission, Santa Fe.

Location - Production

The San Juan basin comprises an area of over 12,000 sq. miles, located principally in northwestern New Mexico and southwestern Colorado. It also includes a narrow strip of northeastern Arizona and the southeastern corner of Utah. Within this area commercial oil and gas is produced from formations of Pennsylvanian, Permian (Boundary Butte) and Upper Cretaceous age. During 1948, the San Juan basin produced over 620,000 bbl. of high-gravity oil and approximately 7,276,000,000 cu. ft. of dry gas. Accumulative production to January 1, 1949, was in excess of 13,912,000 bbl. of oil and 60,300,000,000 cu. ft. of gas.

General Structural Features

The structural and depositional history of a large part of the San Juan basin parallels that of the southern Rocky Mountains, to which it is closely related. The basin is both a structural and a topographic depression which in general cross-section approximates the shape of a broad shallow bowl. In the central portions of the basin the beds are flat or nearly so, but around the edges they are upturned and rise to form the flanks of the mountain uplifts.

The north edge of the basin is a steep monocline caused by the San Juan Mountains, which extend along that border. The eastern side is complicated by faulting, but has a general westward dip away from the Nacimiento Mountains. The south flank of the basin, bordering on Mount Taylor and the Zuni Mountains, is also rather complex, although at a distance from these larger features a general northward dip into the basin prevails. The western side of the basin is a monocline formed by the Defiance uplift and the Carrizo Mountains of Arizona.

Major Uplifts

The San Juan Mountains represent the largest and most extensive structural unit bordering on the basin. This mountain range extends along the north and northeast border of the basin and is one of the most southerly ranges of the Rocky Mountain system. Generally speaking, these mountains represent a great, complexly faulted and folded, domal uplift that began its history near the close of the Cretaceous, continued through the Laramide orogeny on into the Cenozoic, and culminated about the close of the Tertiary.

The LaPlata Mountains, located on the southwest flank of the San Juan uplift, are a closely associated group often considered as an outlying part of the San Juan ranges. They are also a domed uplift, but complicated by a laccolithic intrusion that occurred some time in the late Tertiary.

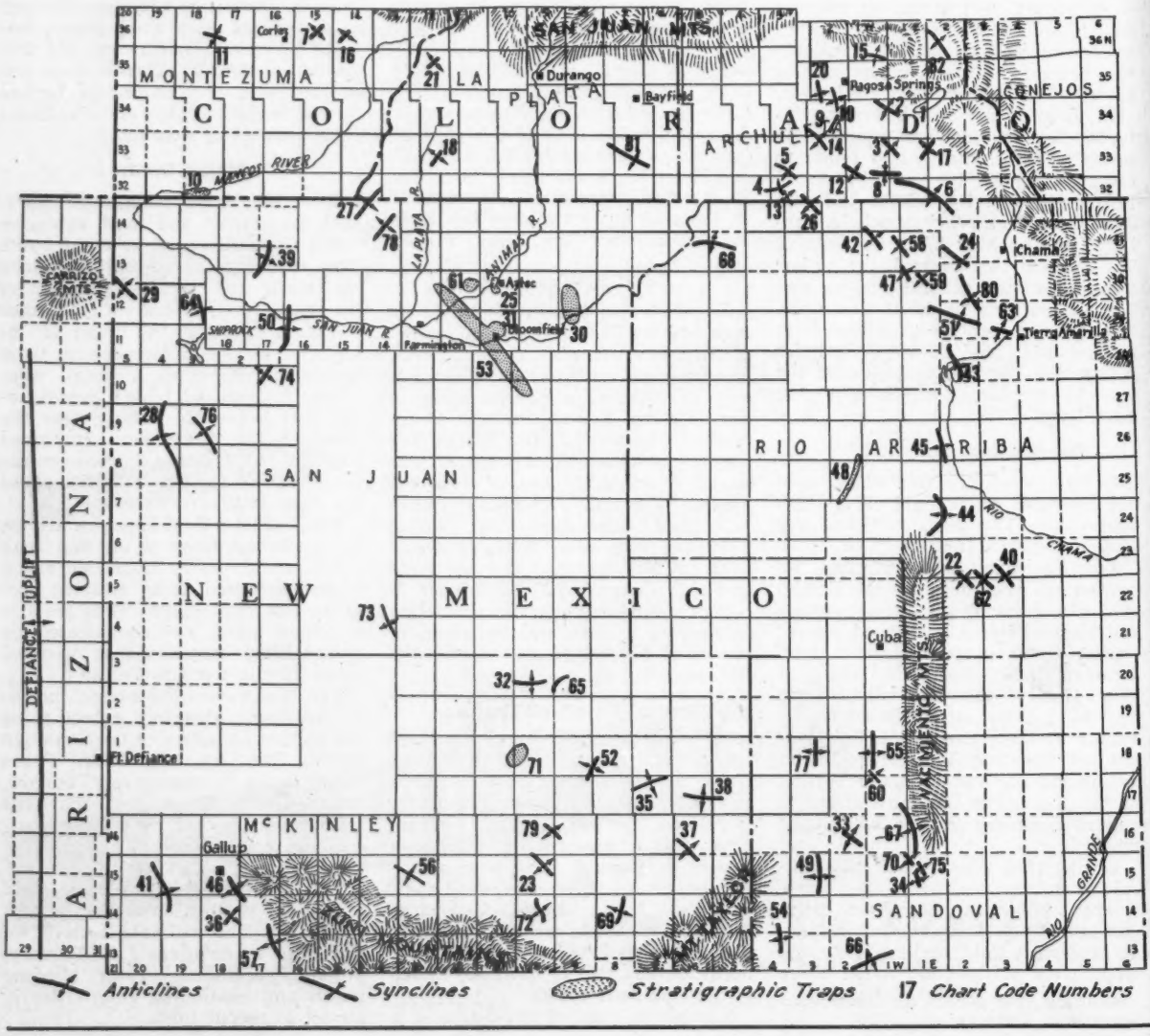
The Nacimiento Mountains, including San Pedro Mountain, extend along the eastern boundary of the San Juan basin. The Nacimiento-San Pedro range is a comparatively narrow, faulted, and folded belt that has moved westward above a steep, east-dipping, thrust fault. Their history began in the early Tertiary.

The Mount Taylor volcanic field forms the southeastern boundary of the basin. The volcanic activity of this area is dated as late Tertiary, probably beginning in the Miocene epoch and continuing intermittently almost to recent times.

Table 1—Structures of the

COLORADO

Map No., structure or area, and location—	Remarks
1 Blanco basin area, Archuleta Co., 34, 35n-1, 2e	Possible geophysical high (?). Drilled to 3,060 ft. in Mancos shale (?). Valley fill and landside debris at surface. P. and A.
2 Blue Creek anticline, Archuleta Co., 34n-1e and 1w	**Untested.** Mancos shale and Mesaverde at surface.
3 Boon Creek anticline, Archuleta Co., 33n-1e and 1w	Drilled to Morrison formation. Mesaverde at surface. Oil shows in Mancos, sulfur water in Dakota sandstone. P. and A.
4 Camado anticline, Archuleta Co., 32n-3w	**Untested.** Animas formation at surface.
5 Cat Creek anticline, Archuleta Co., 32, 33n-3w	**Untested.** Animas formation at surface.
6 Chromo anticline,* Archuleta Co., 32n-1, 2e	Drilled to pre-Cambrian, no Pennsylvanian present. Produces small amount of oil from Mancos shale.
7 Cortez anticline, Montezuma Co., 36n-15w	Surface and seismograph structure. Drilled through Dakota sandstone. No production.
8 Coyote Park, Archuleta Co., 33n-1e and 1w	**Untested.** A syncline along the northwest side of the Chromo anticline.
† Dove Creek anticline,* Montezuma Co., 38, 39n-19w	Test well made 1,700,000 cu. ft. gas and 254 bbl. distillate per day from Pennsylvanian.
9 Eight Mile Mesa, Archuleta Co., 34n-1, 2w	**Untested.** A faulted structure. Mesaverde and Dakota at surface.
81 Ignacio, LaPlata Co., 33n-7, 8w	**Untested.** Wasatch at surface.
10 Mancos Creek, Montezuma Co., 32n-18w	Drilled to Dakota sandstone. Mancos shale at surface. Oil shows in Mancos. A monocline. Abandoned.
11 McElmo anticline, Montezuma Co., 36n-17, 18w	Drilled to 7,112 ft. Oil shows in Pennsylvanian. P. and A. CO_2 in Mississippian and Devonian.
12 Montezuma anticline, Archuleta Co., 33n-1w	**Untested.** Lewis shale at surface.
13 Navajo River anticline, Archuleta Co., 32n-3w	**Untested.** Animas formation at surface.
14 Newton Mesa anticline, Archuleta Co., 33, 34n-2w	Drilled to Dakota sandstone (?). Mesaverde at surface. Sulfur water, P. and A.
15 Pagosa dome, Archuleta Co., 36n-1w	Drilled to Dakota sandstone. Mancos shale at surface. Sulfur water in Dakota. P. and A.
16 Point Lookout,* Montezuma Co., 36n-14w	Drilled to Dakota sandstone and produces 250,000 cu. ft. gas per day from the Dakota.
17 Price anticline,* Archuleta Co., 33n-1, 2e	Produces 32°-gravity oil from the Dakota sandstone.



San Juan Basin

Map No., structure or area, and location—	Remarks
82 Quartz Creek anticline, Archuleta Co., 36n-1, 2e	**Untested.**
18 Red Mesa, Montezuma Co., 33n-12w	Drilled to Morrison. Shows of oil in Mancos shale and Dakota sandstone with small production. Abandoned. A broad dome.
19 Stinking Spgs. anticline, Archuleta Co., 34, 35n-2w	**Untested.** Dakota sandstone and Mancos shale at surface.
20 Sunetha anticline, Archuleta Co., 35n-2w	Drilled to granite. P. and A. 1,322 ft. Dakota sandstone and Mancos shale at surface.
21 Thompson Park anticline, Montezuma and LaPlata Co., 35n-12w	Drilled to Morrison (?). P. and A.
NEW MEXICO	
22 Agua Zarca anticline, Rio Arriba Co., 22, 23n-2e	**Untested.** Triassic at surface.
23 Ambrosia anticline, McKinley Co., 15n-10w	Drilled to Morrison formation. Mancos shale at surface.
24 Azotea anticline, Rio Arriba Co., 31n-2e	Drilled to 2,300 ft. with shows of oil in the Dakota sandstone. Mancos shale at surface.
25 Aztec, San Juan Co., 30n-11w	Has produced gas from Farmington sandstone stratigraphic trap.
26 Barella dome, Rio Arriba Co., 32n-3w	Drilled to Mesaverde (?). Animas formation at surface.
27 Barker dome,* San Juan Co., 32n-14w	Produces gas from the Dakota sandstone and Pennsylvanian.
28 Beautiful Mtn. anticline, San Juan Co., 25n-19w	Drilled to 3,290 ft. in Triassic. Reported shows of oil in the Entrada sandstone (Jurassic).
29 Biltabito dome, San Juan Co., 12, 13n-5w, Navajo Meridian	Entrada sandstone at surface. Drilled to 4,840 ft. in Cambrian quartzite. P. and A. with no substantial shows of oil or gas.
30 Blanco,* San Juan Co., 30n-9w	Produces gas from the Pictured Cliffs sandstone and Mesaverde formation. Some gas in Farmington sandstone. Stratigraphic trap.
31 Bloomfield,* San Juan Co., 29n-11w	Produces oil from the Farmington sandstone.
32 Bonita anticline, McKinley Co., 20n-10w	Drilled to 3,275 ft. in Mancos shale. Mesaverde formation at surface.
33 Cabezon anticline, Sandoval Co., 16n-2w	**Untested.** Mancos shale at surface.
34 Canada de las Milpas anticline, Sandoval Co., 15n-1e	**Untested.** Jurassic at surface.
35 Carica anticline, McKinley Co., 17n-7w	Drilled to 3,190 ft. in Morrison. Mesaverde formation at surface.
36 Cedar Butte anticline, McKinley Co., 14n-18w	**Untested.** Mesaverde at surface.
37 Chavez anticline, McKinley Co., 15, 16n-6w	Drilled to Morrison. Mesaverde formation at surface.
38 Chico anticline, McKinley Co., 17n-5, 6w	Drilled to Dakota sandstone.
39 Chimney Rock dome, San Juan Co., 31n-17w	Drilled to Morrison. Mancos shale at surface. Reported shows of gas in Tocito sandstone. Water in Dakota.
40 Coyote anticline, Rio Arriba Co., 22, 23n-3e	**Untested.** Permian at surface.
41 Defiance anticline, McKinley Co., 14, 15n-19, 20w	Drilled to 1,405 ft. No oil or gas in Dakota sandstone.
† Devil Canyon anticline, Valencia Co., 11n-7w	**Untested.** Mesaverde formation and Mancos shale at surface.
42 Dulce dome, Rio Arriba Co., 31n-1w	Drilled to Morrison. Mesaverde and Mancos shale at surface.
43 El Vado anticline, Rio Arriba Co., 27, 28n-2e	Drilled to pre-Cambrian. Dakota sandstone at surface. Oil shows in Entrada. No Pennsylvanian section present.
44 French Mesa anticline, Rio Arriba Co., 24n-1, 2e	Drilled to granite at 4,846 ft. Pennsylvanian at 3,500 ft. No oil or gas.
45 Gallina Mtn. anticline, Rio Arriba Co., 26n-2e	**Untested.** Pennsylvanian at surface.
46 Gallup dome, McKinley Co., 15n-18w	Drilled through Dakota to 2,265 ft. No oil or gas. Well now drilling below 2,400 ft.
47 Garcia anticline, Rio Arriba Co., 30n-1e	**Untested.** Mesaverde at surface.
48 Gavilan area, Rio Arriba Co., 25n-2w	Drilled to Pictured Cliffs (?) sandstone. Shows gas and oil in Farmington sandstone (?). Possible stratigraphic trap.
49 Guadalupe anticline, Sandoval Co., 15n-3w	**Untested.** Mancos shale at surface.
50 Hogback anticline, San Juan Co., 29n-16, 17w	Produces 65°-gravity oil from the Dakota.
51 Horse Lake anticline, Rio Arriba Co., 29n-1, 2e	Drilled to 1,785 ft.
52 Hospah anticline, McKinley Co., 17, 18n-8, 9w	Produces 30°-gravity oil from the Mesaverde.
53 Kutz Canyon-Fulcher basin,* San Juan Co., 27, 28, 29, 30n-10, 11, 12, 13w	Produces gas from the Pictured Cliffs sandstone and a little oil from the Dakota sandstone. A stratigraphic trap.
54 LaGunitas anticline, Sandoval Co., 13, 14n-4w	Drilled to pre-Cambrian. Mancos shale at surface.
55 LaVentana anticline, Sandoval Co., 18n-1w	Drilled to Morrison. Mancos shale at surface. Water in Dakota sandstone.
56 Mariano dome, McKinley Co., 15n-13w	Drilled to granite. Mancos shale at surface. P. and A. with no shows oil or gas.
57 McGaffey anticline, McKinley Co., 13n-17w	**Untested.** Triassic (?) at surface.
† Meyers dome, McKinley Co., 11n-11w	**Untested.** Permian at surface.
58 Monero dome, Rio Arriba Co., 30, 31n-1e, 1w	Drilled to Dakota sandstone. Mancos shale at surface.
59 N. Horse Lake anticline, Rio Arriba Co., 30n-1e	**Untested.** Mancos shale at surface.
60 Olguin anticline, Sandoval Co., 17, 18n-1w	**Untested.** Mancos shale at surface.
61 Oswell, San Juan Co., 30n-11, 12w	Has produced gas and distillate from the Farmington sandstone, stratigraphic trap.
62 Poleo Creek anticline, Rio Arriba Co., 22, 23n-2, 3e	**Untested.** Permian at surface.
63 Puente anticline, Rio Arriba Co., 29n-3e	**Untested.** Dakota sandstone and Mancos shale at surface.
64 Rattlesnake dome,* San Juan Co., 29, 30n-19w	Produces oil from the Dakota sandstone and Hermosa (Pennsylvanian).
65 Red Mtn., McKinley Co., 20n-9w	Has produced oil from the Mesaverde. A fault structure.
66 Rio Puerco anticline, Sandoval Co., 12, 13n-1, 2w	**Untested.** Mancos shale at surface.
67 Rio Salado anticline, Sandoval Co., 16n-1e	Drilled to granite. Chinle at surface. P. and A. at 2,562 ft. No shows.
68 Rosa area, Rio Arriba Co., 31n-5, 6w	Now drilling to test Dakota sandstone. Oil shows in Farmington sandstone, gas in Pictured Cliffs.
69 San Mateo dome, McKinley Co., 14n-8w	Drilled to Morrison. Mancos shale at surface.
70 San Ysidro anticline, Sandoval Co., 15n-1e, 1w	**Untested.** Jurassic at surface.
† Seco Canyon anticline, Valencia Co., 10n-7w	**Untested.** Mesaverde and Mancos shale at surface.
71 Seven Lakes, McKinley Co., 18n-10, 11w	Has produced oil from the Mesaverde. Stratigraphic trap.
72 South Ambrosia Lake anticline, McKinley Co., 14n-10w	Drilled to Morrison.
73 Stoney Butte anticline, San Juan Co., 21, 22n-13, 14w	Produced oil from the Mesaverde.
74 Table Mesa dome,* San Juan Co., 27n-17w	Produces 56°-gravity oil from the Dakota sandstone.
75 Tierra Amarilla anticline, Sandoval Co., 15n-1e	**Untested.** Jurassic (?) at surface.
76 Tocito dome, San Juan Co., 26n-18w	Drilled to Triassic. Mancos shale at surface. Shows of gas in Ouray-Leadville limestone.
77 Torreon anticline, Sandoval Co., 18n-3w	Drilled to Dakota. Oil shows in Mesaverde. Water in Dakota. Mesaverde at surface.
78 Ute dome,* San Juan Co., 32n-14w	Produces gas from the Dakota sandstone. Mesaverde at surface.
79 Vogt anticline, McKinley Co., 16n-9, 10w	Drilled to Dakota sandstone. Mesaverde at surface.
† Wiley Ranch anticline, Valencia Co., 11n-7, 8w	**Untested.** Mesaverde and Mancos at surface.
80 Willow Creek anticline, Rio Arriba Co., 29, 30n-2e	Drilled to granite at 2,054 ft.

*Producing oil or gas field. †Not shown on map. P. and A.—Plugged and abandoned. For Nos. 81 and 82 see Ignacio and Quartz Creek, Colorado.

The Zuni Mountains occupy the southwestern flank of the San Juan basin. These mountains are a broad, asymetrical, domal uplift that was probably formed between early Eocene and late Miocene time.

The Defiance uplift extends along the western side of the basin, forming a broad, flat crested anticline with very gentle dips on the western flank and comparatively steep dips on the eastern flank. The eastern side is essentially a monocline with dips of from 10° to 30°.

The Carrizo Mountains, located in the northeast corner of Arizona, are a laccolithic intrusion similar to the LaPlata Mountains.

There are two other uplifts that should be mentioned in passing. They are the Uncompahgre - Sangre de Cristo and Defiance-Zuni uplifts that existed during Pennsylvanian and Permian times and into the Mesozoic. These uplifts are notable because of the influence they extended over the sediments deposited on their flanks. This is reflected today in the character of the Pennsylvanian formations within the San Juan basin.

The Uncompahgre-Sangre de Cristo uplift was located in southwestern Colorado with a lobe reaching south into North Central New Mexico. The Defiance-Zuni uplift extended from New Mexico into Arizona along a line roughly following the southwest border of the present San Juan basin. These uplifts were submerged and buried during the Mesozoic and are not directly related to the present mountains. However, their location and existence is an important consideration when prospecting for Pennsylvanian oil and gas.

Minor Structures

An examination of the map, Fig. 1, will show that the structures listed in Table 1 are practically all grouped along the flanks of the mountains. These minor structures are subsidiary to the major uplifts and resulted from the same forces that gave rise to the larger features. As indicated in the preceding outline of the major uplifts, the mountain masses are not all of identical age. The folding of the San Juan Mountains began about the close of the Cretaceous, but the Nacimiento Mountains and Zuni Mountains did not begin their final history until after the beginning of the Tertiary.

Since the major uplifts are not all contemporaneous, it is reasonable to assume that the subsidiary structures are also of varying ages. This age difference may have an important bearing on oil accumulation in various parts of the San Juan basin. Those structures formed after the main folding was completed and after water had entered the formations and migration of the oil had begun would be less apt to contain commercial accumulations than structures formed during an earlier period.

It would require more space than can be allowed here to divide all the structures in Table 1 into age groups. However, it is suggested that the relationship between time of origin of the various structures and the time of migration of the oil contained within the productive formations is of sufficient importance to warrant consideration when selecting areas to prospect or structures to drill.

Seven of the structures listed in Table 1 are stratigraphic traps. Six of these have produced oil or gas and the seventh (Gavilan area) was inconclusively tested, but additional drilling is planned for 1949. Stratigraphic traps are becoming increasingly important within the San Juan basin and several stratigraphic wildcats are contemplated for 1949. Stratigraphic traps have produced 36,320,000,000 cu. ft. of gas and over 50,000 bbl. of 40°-60°-gravity oil and distillate, within the basin to date. Completion of additional pipe-line facilities will substantially increase stratigraphic gas from undeveloped areas.

Two fault structures are listed in Table 1, and one of these, Red Mountain, New Mexico, has produced over 7,100 bbl. of 43°-gravity oil. This production was from very shallow depth (400 to 500 ft.) in the Mesaverde formation. The other fault structure listed is Eight Mile Mesa in Colorado, which has not been tested. There are a great many possible fault traps within the San Juan basin, and if drilling depths are not excessive they are certainly worth testing.

A total of 87 structures are listed in Table 1. Twenty of these (Table 2) have produced oil or gas in the past or are producing fields today. Thirty of the structures listed have never been drilled and many of those drilled have only been partially tested. Very few structures have been drilled to the Pennsylvanian and some have not even tested the entire Upper Cretaceous section. More than 30 per cent of the drilled structures have produced oil or gas. This is an encouraging average, and indicates that if drilling is based on sound geological principles the chances of success are very good.

Regarding the untested structures, some of these are unfavorable due to various conditions such as small size, lack of closure, poor stratigraphic or structural conditions, proximity of dry holes, and other contributing factors. Some of these structures are not worth testing, but about half of them have decided possibilities and will undoubtedly be drilled in the near future. The reader should not infer that the untested structures listed are the only ones in the San Juan basin. There are other undrilled structures and new ones are found from time to time as the result of geological and geophysical exploration now going on. There are still many relatively unexplored places in the San Juan basin that should provide new structures of various types.

We can conclude that the San Juan basin has not yet reached the peak of either exploration or development activity. It is still a dynamic area possessed of constantly expanding possibilities, and the limit of its productive potential is not yet in sight.

TABLE 2—OIL AND GAS FIELDS OF THE SAN JUAN BASIN

Colorado

Field and content—	Productive formation
Chromo anticline—Oil	Mancos shale
Dove Creek—Oil and gas	Paradox
Mancos Creek*—Oil	Mancos shale
Point Lookout—Gas	Dakota ss.
Price—Oil	Dakota ss.
Red Mesa*—Oil and gas	Dakota and Mancos

New Mexico

Aztec*—Gas	Farmington ss.
Barker Creek—Gas	Paradox and Dakota
Blanco—Gas	Mesaverde, Pictured Cliffs, and Farmington
Bloomfield—Oil and gas	Farmington ss.
Hogback—Oil	Dakota ss.
Hospah—Oil	Mesaverde
Kutz Canyon-Fulcher basin—Oil and gas	Dakota ss. and Pictured Cliffs
Oswell*—Gas	Farmington ss.
Rattlesnake—Oil	Hermosa formation and Dakota ss.
Red Mountain*—Oil	Mesaverde
Seven Lakes*—Oil	Mesaverde
Stoney Butte*—Oil	Mesaverde
Table Mesa—Oil	Dakota ss.
Ute dome—Gas	Dakota ss.

*Shut in or abandoned.

TABLE 3—GENERAL STRATIGRAPHY OF THE SAN JUAN BASIN

Age	Formation
Miocene and Pliocene	Santa Fe formation
Eocene and Paleocene	Wasatch
Paleocene and Upper Cretaceous	Nacimiento group (Torrejon and Puerco) Animas formation
Upper Cretaceous	Ojo Alamo sandstone McDermott formation Kirtland shale (Farmington sandstone) Fruitland formation Pictured Cliffs sandstone Lewis shale Mesaverde group Mancos shale Dakota sandstone
Jurassic	Morrison formation San Rafael group Navajo sandstone Wanakah formation Entrada sandstone
Triassic	Chinle formation
Permian	Cutler formation
Pennsylvanian	Hermosa and Paradox formations Molas formation
Mississippian	Leadville limestone
Devonian	Ouray limestone Elbert formation
Cambrian	Ignacio quartzite
Pre-Cambrian	Granite and schist

Only the SHAFFER Double Cellar Control Gate

combines these vital advantages

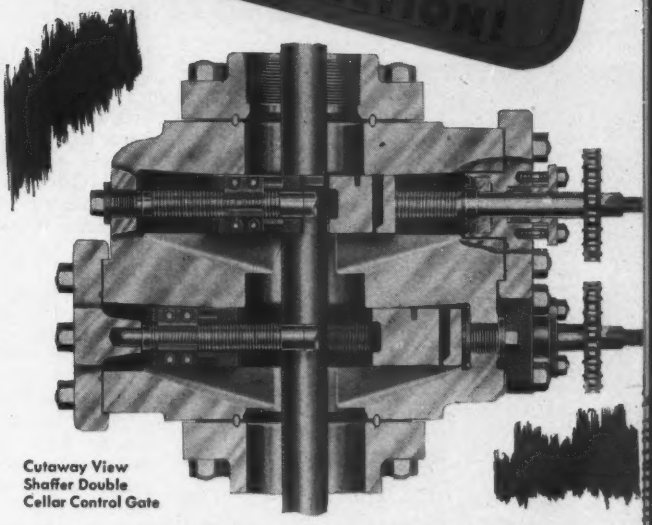
Only SHAFFER Cellar Control Gates combine *so many* basic advantages in one piece of equipment. And the Shaffer *Double* Cellar Control Gate goes one step further by combining *all* these outstanding Shaffer advantages into a space-saving compactness that has no equal in modern control gate equipment.

Even the *largest* size Shaffer Double Cellar Control Gate requires *less than* 29" of overall height!

Yet in this unusually compact space you get *two* ram compartments—the upper equipped with rams for closing off around the pipe, and the lower equipped with rams for closing off open hole.

Each set of rams is operated with a mechanism so positive, so foolproof and so adaptable to varying rig requirements that it provides vital advantages found in no other cellar control gate.

ADAPTABLE TO ANY POWER REQUIREMENT—For example, the rams in a Shaffer Double Cellar Control Gate can be operated by virtually *any* type of rig power—air, hydraulic, steam or electric drive *plus the added protection of full manual standby in case of power failure.*



Cutaway View
Shaffer Double
Cellar Control Gate

Furthermore, these power drives can be readily installed either on the mat or outside the rig at a remote distance from the Gate. In either position, only a few simple power connections are required and all controls can be conveniently located near the driller—or at any other desired point.

So there you have *two-way* power adaptability—adaptability as to *type* of power, and adaptability as to *location* on the rig!

OPERATION IS SIMPLE, FOOLPROOF AND POSITIVE—Here's something else you get in the compact Shaffer Double Cellar Control Gate—a field-proven mechanical drive that is as simple as it is positive. Not only do the rams open and close quickly and easily, but they *stay* wherever they are set *without locking devices or secondary operations of any kind!*

Close them—and they *stay* closed as long as desired. Nothing to tighten, nothing to "lock," nothing to forget in the rush of emergencies!

Open them—and they *stay* open without risk of "working" partially closed and becoming damaged by tools raised or lowered in the well.

Combine these features with the many *other* Shaffer advantages (some of which are outlined in the panel) and you readily see why Shaffer Cellar Control Gates are the outstanding choice of leading operators the world over. Get ALL the facts and you will get Shaffer!

Additional Advantages in Shaffer Gates

In addition to the advantages of maximum compactness, adaptability and safety outlined above, there are also many other vital features built into Shaffer Cellar Control Gates. For example . .

Simple Installation: Regardless of the type of power drive you select, installation of a Shaffer Gate is unusually simple, easy and clutter-free. No complicated manifolding, no jumble of pipe lines, no installation problems to boost labor and rig-up costs.

Mud-Free Operation: Rams travel on high mud-free ribs while sand, mud and other debris is quickly drained back into the well by the steep inward slope in the bottoms of Shaffer ram compartments.

Equalized Ram Pressures: Shaffer Gates are so designed that the well pressure behind the rams assists in closing and holding the rams shut. The higher the well pressure the tighter the seal!

Fast Ram Changes: In a Shaffer Gate the rams can be completely changed by removing just ONE end cover. This saves time, simplifies changeovers!

Built-In Flow Connections: Not only are Shaffer Gates unusually compact, but additional space is saved by the integral mud cross built into the Gate body below the lower ram compartment. No need to waste space with the conventional mud cross!

Be sure to get the complete story before investing in ANY cellar control gate equipment!

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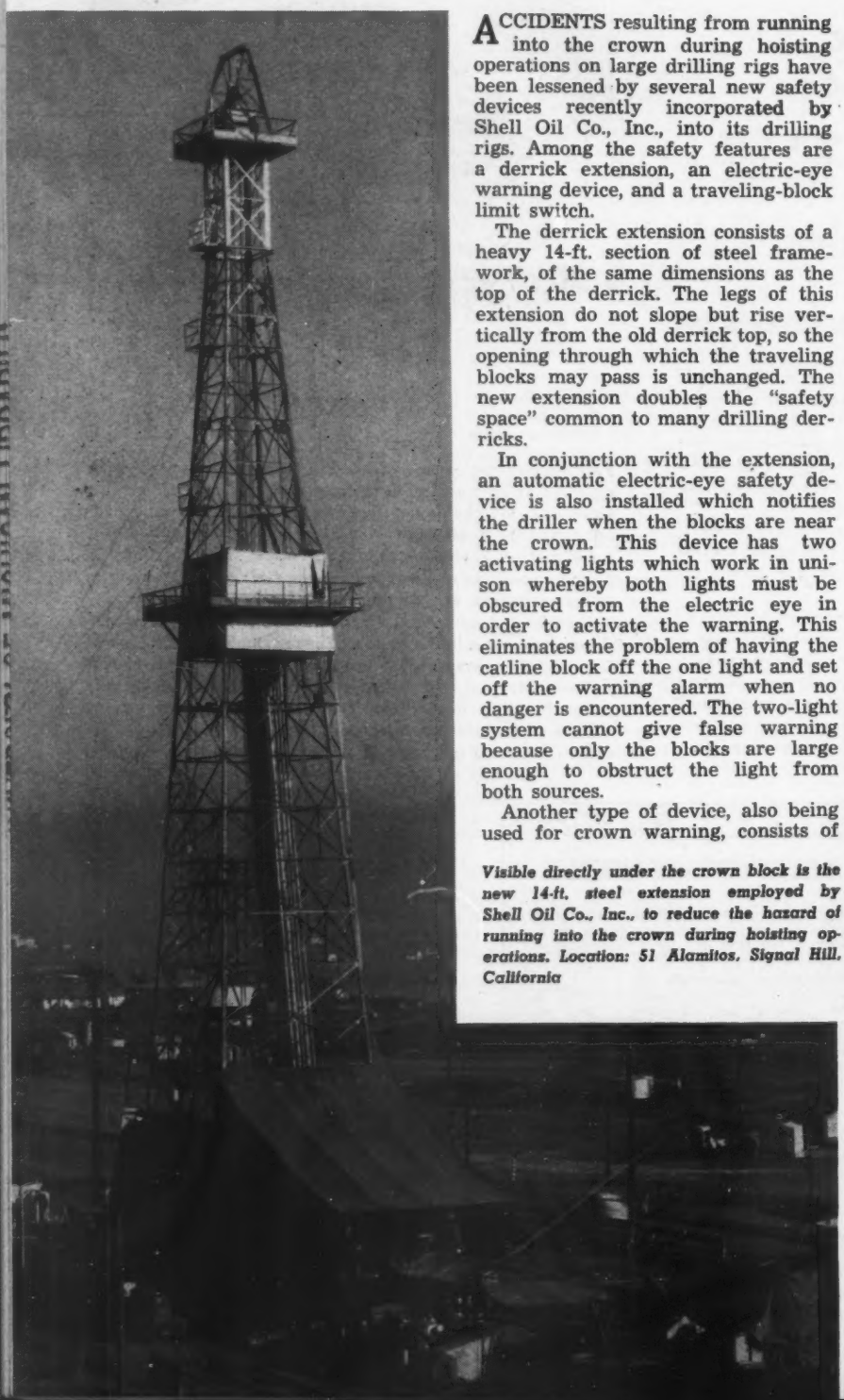
Shell Installs New Safety Features on Drilling Rigs

Crown warning device shuts off power automatically



ACCIDENTS resulting from running into the crown during hoisting operations on large drilling rigs have been lessened by several new safety devices recently incorporated by Shell Oil Co., Inc., into its drilling rigs. Among the safety features are a derrick extension, an electric-eye warning device, and a traveling-block limit switch.

The derrick extension consists of a heavy 14-ft. section of steel framework, of the same dimensions as the top of the derrick. The legs of this extension do not slope but rise vertically from the old derrick top, so the opening through which the traveling blocks may pass is unchanged. The new extension doubles the "safety space" common to many drilling derricks.

In conjunction with the extension, an automatic electric-eye safety device is also installed which notifies the driller when the blocks are near the crown. This device has two activating lights which work in unison whereby both lights must be obscured from the electric eye in order to activate the warning. This eliminates the problem of having the catline block off the one light and set off the warning alarm when no danger is encountered. The two-light system cannot give false warning because only the blocks are large enough to obstruct the light from both sources.

Another type of device, also being used for crown warning, consists of a limit switch mounted on the water table and a weight riding on the deadline suspended from the switch by a cable. When the blocks reach their upper limit of travel they pick up the weight, allowing the switch to make contact and sound the warning signal.

Equipment is being installed that will operate with the crown warning apparatus to shut off the power to the draw works if the driller accidentally fails to close the throttle in time.

Also new is the installation of a canvas engine house. This engine house is entirely portable and can be dismantled and rolled up when the rig is moved. Its basic construction is like that of a tent, the high side of the covering being attached to the rig by means of a pole which is fastened to the derrick girts with clamps. The lower side of the covering is attached to a similar pole hung on hinged legs. Steel cables are tied to both ends of the pole and to the lower end of the rig base. By means of turnbuckles a constant strain is kept on the cables, thereby giving rigid support to the canvas engine-house covering.

Visible directly under the crown block is the new 14-ft. steel extension employed by Shell Oil Co., Inc., to reduce the hazard of running into the crown during hoisting operations. Location: 51 Alamitos, Signal Hill, California

Mobile Geology Lab Keeps Pace With Drilling Rigs

SUBSTRATA earth drill-cutting samples are analyzed at the well in this unique mobile laboratory, a converted passenger car outfitted with all essential geological instruments and equipment, by J. M. Huber Corp., Borger, Tex., producer of oil and gas. The well cuttings are dried with heat furnished by car heater. Microscope light plugs into special dsahboard

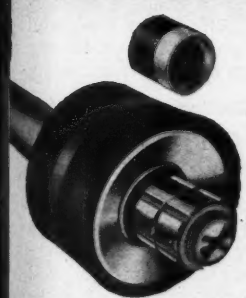
connection. An altimeter, usually seen in airplanes, checks elevations. Cutting data for succeeding depths are recorded on strip log.

Huber last year completed 60 producing wells out of 80 drilled in its 10-state exploratory operations. Six new discovery fields were opened in Kansas from 19 wildcat wells, an almost 1 to 3 ratio.

Mission REPLACEABLE RUBBERS

... speed operations!

... save money!



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THE MISSION PISTON with ***replaceable rubbers*** has introduced important savings in drilling operations.

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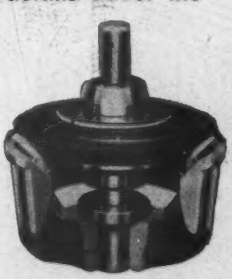

MISSION Slush Pump Valve

Mission SLUSH PUMP PISTONS

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Interpretation of Core Analysis Results

. . . On Cores Taken With Oil or Oil-Base Mud

*by Ward M. Edinger**

WHILE the advantages of coring with oil or oil-base mud are well known with respect to maintenance of initial productivity through elimination of swelling of certain types of matrix, the matter of interpretation of core-analysis results under these circumstances needs clarification. It is the purpose of this paper to present factual data and to attempt interpretation in the light of the author's experience.

Certain general considerations may be reviewed at this point. Coring with oil or with oil-base mud is similar to coring with water-base mud to the extent that an alteration of fluid saturation and saturation distribution may, and usually does, occur. Regardless of the zero or low filter-loss properties of any mud, both laboratory and field experience has shown that such is the case.

In water-base mud coring the oil saturation is usually reduced to the irreducible minimum at bottom-hole conditions and the connate water is diluted or displaced to some extent with the mud filtrate. The foregoing statement needs qualification with respect to mobility index, or the ratio of the permeability to oil to the absolute viscosity of the oil at bottom-hole conditions. It may be shown that low mobility indexes tend to minimize contamination. Table 1 shows the results of analysis of cores taken with water-base mud and rotary tools.

*Production Engineering Laboratories, Oklahoma City. Portion of paper (certain figures and discussion omitted) given at spring meeting of Mid-Continent district, A.P.I. Division of Production, Tulsa, March 23-25.

TABLE 1

Analysis of Section Cored in Water-Base Mud, Showing Effect of Low Mobility Index on Residual Oil and Water Saturation

Depth, ft.	1,545-55
Permeability, md.	433
Porosity, per cent	20.5
Oil saturation, per cent	78.0
Water saturation, per cent	17.4
Gravity of produced oil, °A.P.I.	21
Bottom-hole viscosity, cp.	800
Mobility index, md./cp.	0.54

The oil saturation of 78 per cent and the water saturation of 17.4 per cent in relatively high-permeability sand is not surprising in view of the bottom-hole viscosity of 800 cp., or a mobility index of 0.54 md./cp.

Oil or oil-base-mud coring, properly conducted, leaves the connate water intact and, therefore, provides a ready means of determining connate water. While connate water can be determined or estimated by other methods, oil coring provides the simplest means. Thus, the alteration resolves itself to changes in residual-oil saturation and/or changes of voidage as compared with water-base mud coring which process involves the further alteration of water saturation.

Useful Applications Discussed

The process of coring in oil or oil-base mud, hereinafter referred to as "oil coring," lends itself to several useful applications. The operator who is interested in reservoir evaluation for secondary-recovery operations may obtain sufficient data from one well to indicate the advisability of additional testing. Thus, if the total water saturation is sufficiently high to indicate a watered-out condition, a situation not uncommon in shallow pools with poor plugging practice in the past, this situation can be immediately recognized in oil-coring techniques.

The same reservoir cored with water-base mud might show a high water saturation, particularly in low-pressure areas, that could be interpreted as a normal condition and due to contamination. No suitable methods, to the knowledge of the author, have been developed to distinguish between connate water and extraneous water in cores taken with water-base mud. The hazard involved is, therefore, self-evident. It develops, in

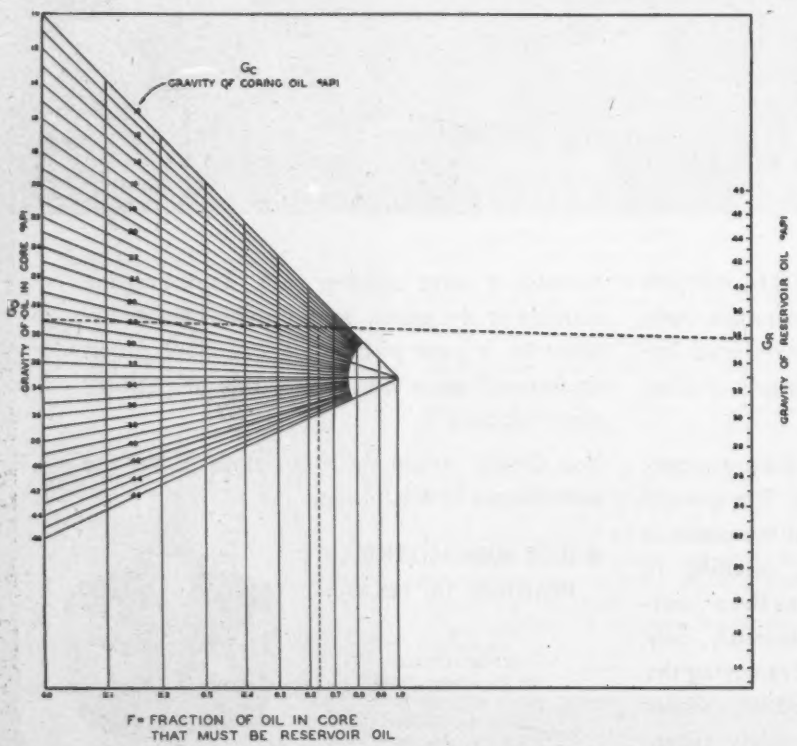
Gc
GRAVITY OF CORING OIL °API
GRAVITY OF OIL IN CORE °API
Go
GRAVITY OF RESERVOIR OIL °API
F= FRACTION OF OIL IN CORE
THAT MUST BE RESERVOIR OIL

Fig. 1—Alignment chart for calculating fraction of reservoir oil in core sample.

$$\text{Equation: } F = \frac{(G_o - G_c)\,(131.5 + G_r)}{(G_r - G_c)\,(131.5 + G_o)}\dagger$$

Example: $G_o = 29°$; $G_c = 18°$; $G_r = 36°$
Connect 29° on G_o scale to 36° on G_r scale.
Read 0.64 on F scale at intersection of 18° on G_c scale.

†Nomenclature given on following page.

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fact, that the total water saturation from any and all causes is far more important, in the instance just cited, than a theoretical determination of connate water.

Furthermore, it is of interest to ascertain the degree of depletion that has occurred already in the reservoir and to note the presence of primary or secondary gas caps, where such information cannot be obtained because of incomplete past production history. Certain inferences may be drawn from these facts, at least in a semi-quantitative manner, by oil coring employing tracers or density measurements of the liquids found in the core sample.

The author has found it is practical to ascertain these data by oil coring using as the coring medium an oil of substantially lower gravity than that of the produced oil. While tracers would accomplish essentially the same result, the lower-gravity, and hence higher-viscosity oils, will, in themselves, prevent contamination to a large extent, and eliminate tedious calculations.

A detailed discussion of laboratory techniques is not in order here, but laboratory technicians are familiar with the fact that a sample of oil may be removed from a core by water displacement, extraction, or retorting, and its density determined by direct measurement or by suspension in an immiscible liquid of known density.

Obviously the volume of oil found in a given sample of core is equal to the volume originally in place at the time of coring plus the volume of oil or oil-base mud filtrate that has entered the core less the respective fractions of the oils that have been expelled or displaced. Simultaneously, the weight of the oil found in the core sample is likewise equal to weight in place plus the additional weight due to oil added less the respective weights of the fractions of oil displaced or expelled. Stated mathematically:

$$V_o = V_r (1 - a) + V_c (1 - b) \quad (1)$$

$$V_o g_o = V_r g_r (1 - a) + V_c g_c (1 - b) \quad (2)$$

Solving (1) and (2) simultaneously and eliminating V_c:

$$V_r/V_o = (g_c - g_o)/(g_c - g_r)(1 - a) \quad (3)$$

Dimensionally, the above equations require the measurements to be made in terms of oil volumes and densities expressed in consistent units. In practice, however, we can use the numerical equivalents of gravities and percentage pore space. By substituting °A.P.I. in Equation 3 and expressing V_r/V_o as a fraction:

$$V_r/V_o = F = \frac{(G_o - G_c)(131.5 + G_r)}{(G_r - G_c)(131.5 + G_o)(1 - a)} \quad (4)$$

Solutions of Equation 4 are given in Fig. 1 for the special case where $a = 0$.

Nomenclature

V_o = volume of stock-tank residual oil found in core sample, per cent pore space.
V_r = volume of stock-tank reservoir oil in core just prior to cutting core, per cent pore space.
V_c = volume of stock-tank coring oil or filtrate which has entered core during coring operations, per cent pore space.
a = fraction of V_r expelled and/or displaced in coring and bringing core to surface.
b = fraction of V_c expelled and/or displaced in coring and bringing to surface.
g_o = density of V_o, stock-tank conditions, g/cc.
g_r = density of V_r, stock-tank conditions, g/cc.
g_c = density of V_c, stock-tank conditions, g/cc.
G_o = specific gravity corresponding to g_o, °A.P.I.
G_r = specific gravity corresponding to g_r, °A.P.I.
G_c = specific gravity corresponding to g_c, °A.P.I.
$F = V_r/V_o$.

As can be shown, this assumption of $a = 0$ leads to a minimum value of V_r which value is important in secondary recovery evaluations.

The analysis of cores from reservoirs depleted by gas expansion, including those which have subsequently been repressured with air or gas, gives information more amenable to quantitative work. Table 2 shows the

TABLE 2

Results of Analysis of Section of Bartlesville Sand at 1,600 Ft. Cored in Oil-Base Mud and Depleted by Gas-Expansion Production

Thickness, ft.	27
Porosity, per cent	15.8
Oil saturation found, per cent	44.3
Water saturation, per cent	50.4
Total liquid saturation, per cent	94.7
Primary recovery, bbl./acre-ft.	40
Calculated present saturation, per cent	42.0
Gravity of filtrate, °A.P.I.	37
Gravity of produced oil, °A.P.I.	35
Gravity of oil in samples, °A.P.I. (avg.)	36.1

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results of a core analysis of the Bartlesville sand, at some 1,600 ft., in which the primary recovery of 40 bbl. per acre-foot is established from production history. The residual saturation (calculated) of 42 per cent checks well with the determined saturation of 44.3 per cent. The gravity of the produced oil is 35° A.P.I. while that of the oil-base mud filtrate is 37° A.P.I. The composite gravity of the residual oil averaged 36.1° A.P.I. which fact indicates some degree of contamination although the similarity of gravities does not admit of precise calculations.

Cable-tool cores are satisfactory for detailed analysis work although several circumstances not present in rotary core work must be guarded against. In nearly every case of cable-tool coring that has come to the author's attention in which these data admit of density calculations, there is strong evidence of a greater degree of contamination than had the cores been taken with a rotary barrel. This observation has been confirmed in the case of water-base mud coring,[3] and the condition is not unexpected in oil coring.

More treacherous than oil contamination in cable-tool work, however, is the tendency of minute volumes of water residing on the walls of the pipe or elsewhere in the hole to alter to some degree both the oil and water saturation. The use of the sand pump bailer in place of the dart type is recommended in this instance. The dropping of a paper sack containing 3 or 4 lb. of bentonite in the hole before switching to oil as the coring medium is also helpful.

It is a matter of simple calculation to demonstrate that a 20-ft. cored section having a porosity of 20 per cent, a connate-water saturation of 30 per cent, and a residual-oil saturation of 50 per cent, can have the water content of the core increased to 50 per cent by imbiding less than 0.2 gal. of water during the coring with a No. 5 cable-tool core barrel. . . .

It may be of interest to evaluate the expulsion or displacement factors a and b given in Equations 1 and 2.

TABLE 3

Characteristics of 1,700-Ft. Section Analyzed in Detail With Calculation of Relative Volumes of Reservoir, Coring, and Composite Oil

Permeability, md.	68
Porosity, per cent	14.8
Oil saturation found (V_o), per cent	42.1
Water saturation, per cent	34.8
Gravity of coring oil (G_c), °A.P.I.	34
Gravity of produced oil (G_r), °A.P.I.	34
Gravity of oil in cores (G_o), °A.P.I.	32
Actual saturation in reservoir (V_r), per cent	53.2
Pore volumes of coring oil in core (V_c), per cent*	44.8
Fraction of V_r displaced or expelled (a)	0.358
Fraction of V_c displaced or expelled (b)	*0.822

*Based on laboratory data showing 1 pore volume of oil displaces 0.8 pore volume of original oil in place.

Table 3 gives the core-analysis values for a sand section at 1,700 ft. and the densities of the produced oil, the coring medium, and the oil found in the cores. The field has produced, in this area, approximately 70 bbl. per acre-foot and it is estimated that the original formation-volume factor was 1.10 bbl. of reservoir stock per barrel of stock-tank oil. Under these conditions, the residual-oil saturation remaining in the cores should, theoretically, be 53.2 per cent while the determined value is 42.1 per cent. Substituting the proper values in Equation 4, one obtains a = 0.358. Stated in words, 35.8 per cent of the oil in place in the core at the time of taking the core has been displaced or expelled. Substituting this value back and solving for the quantity $V_c(1 - b) = 7.96$.

Laboratory experiments on cores from this and similar reservoirs indicate that approximately 80 per cent of the residual oil is removed by passage of one pore volume of displacing oil. As a rough estimate this factor may be used to evaluate one of the unknowns and obtain a solution, which shows $V_c = 44.8$ and $b = 0.822$. Stated again in words, of the original oil saturation of 53.2 per cent, which should be present in the core, 35.8 per cent has been expelled or displaced by 0.448 pore volumes of coring oil, of which 82.2 per cent has been expelled or passed through

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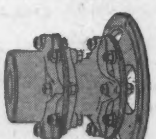
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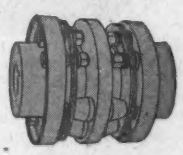
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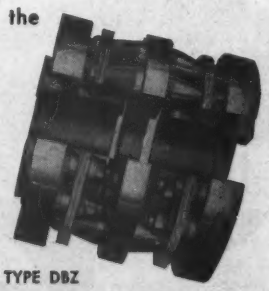
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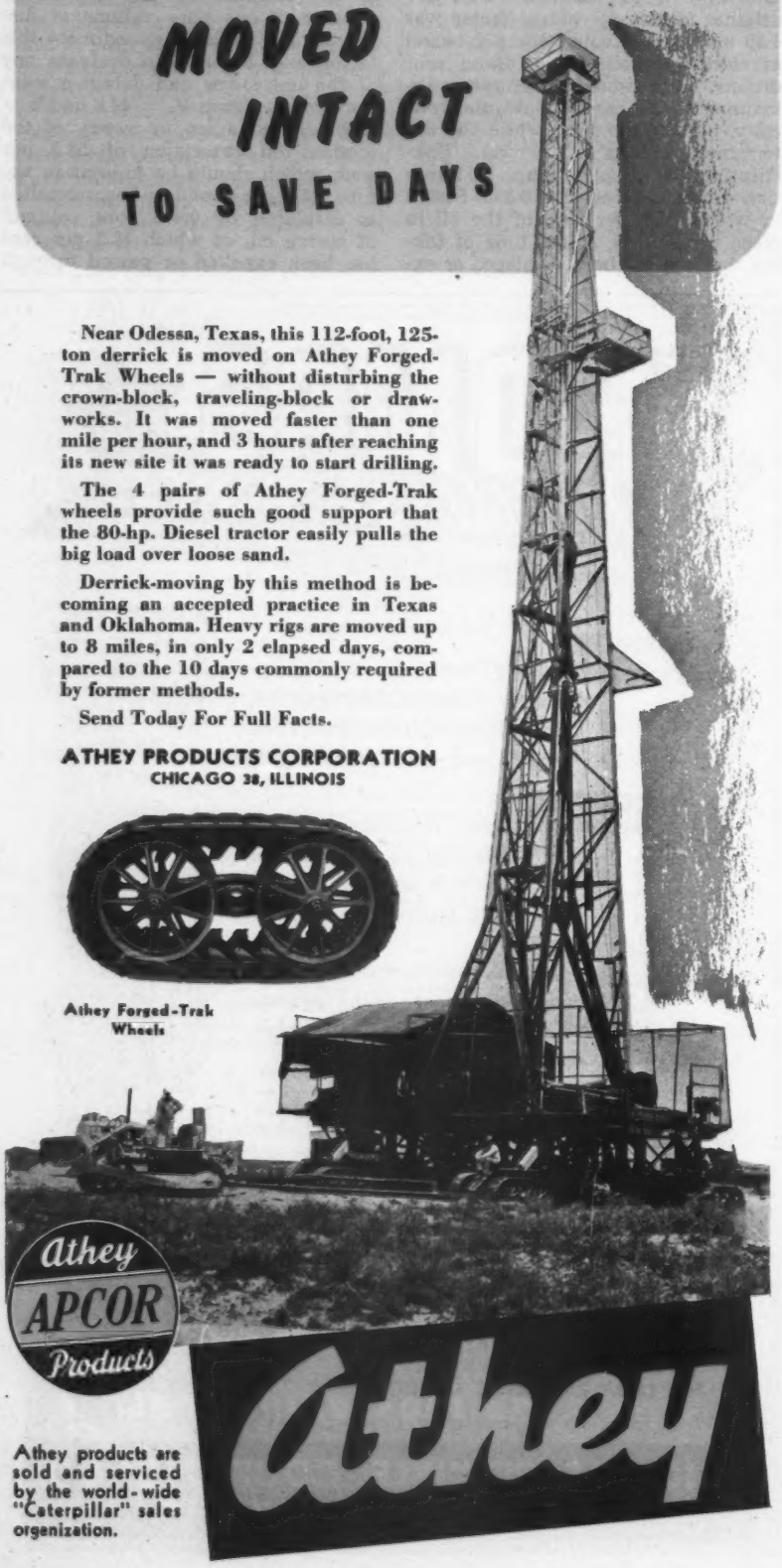

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the core sample, leaving a residual saturation of 42.1 per cent having a gravity of 32° A.P.I. It is, of course, assumed in all cases that oil volumes are additive and that there is no contraction in volume due to blending of oils.[4]

The value of oil coring in determining a watered-out condition is self-evident. Table 4 shows the results of

TABLE 4
Analysis of Watered-Out Zone Cored in Oil With Cable-Tool Barrel

Depth, ft.	970-83
Permeability, md.	51
Porosity, per cent	15.1
Oil saturation, per cent	12.6
Water saturation, per cent	71.4
Gravity of oil, °A.P.I. (produced)	36
Gravity of oil, °A.P.I. (coring)	21
Gravity of oil, °A.P.I. (in cores)	36

analysis of such a section. Production tests subsequently established the condition reflected by the analysis.

In conclusion, the author is of the opinion that oil coring provides cores the analysis of which when properly interpreted furnishes the simplest means of determining connate water, ascertaining the nature of the previous production mechanism, identifying gas caps, and calculating the reserves in secondary-recovery operations. . . .

The author is indebted to M. J. Popovich, of Sohio Petroleum Co., for his suggestions and criticisms, and to the several oil companies which released the analyses used in deleted form.

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2. M. Muskat and M. O. Taylor, "Effect of Reservoir Fluid and Rock Characteristics on Production Histories of Gas-Drive Reservoirs," Petroleum Technology, A.I.M.E. Sept. 1945, p. 9.
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N.P.A. General Session Speakers Are Announced

Speakers for the general session of National Petroleum Association's forty-sixth semiannual meeting, which will be held at Hotel Cleveland in Cleveland, Ohio, April 13-15, have been announced by Fayette B. Dow, general counsel for the association. They include leaders in their fields who were selected for their ability to discuss a variety of topics which are of wide interest to the petroleum industry.

Topics to be given, and the speakers, include.

"Geographical Pricing," by William Simon, recent counsel to the special Senate committee investigating basing-point price systems; "Petroleum Supply and Demand—Review and Outlook," by Richard J. Gonzalez, economist, Humble Oil & Refining Co.; and "The Meaning of the Soviet-American Crisis," by Leland B. Stowe, noted foreign correspondent.

Prediction of Secondary Recovery *from* CORE ANALYSIS

by R. C. Earlougher and J. M. Robinson**

THE important factors desired from core analyses (for prediction of secondary recovery) are as follows:

1. Net sand thickness.
2. Oil content in place in the sand expressed as barrel per acre-foot as well as total barrels per acre.
3. Per cent porosity.
4. Per cent oil and water saturation expressed as percentage of total pore volume.
5. Permeability.
6. Laboratory flooding tests: (a) Recoverable oil by water flooding, 100 per cent efficient. (b) Residual oil saturation after flooding. (c) Differentiation between floodable and nonfloodable sand. (d) Action of fresh water on the sand.
7. Net floodable sand thickness.

Discussion of Core Data Utility

The importance and use of the foregoing determinations are discussed in the following paragraphs.

New sand thickness.—One of the first checks obtained by coring in an old area is that of net thickness of clean sand. Old well logs often are considerably in error so far as actual amount of productive sand is concerned. Cores often show that the clean sand section is no more than 65 per cent of that reported by the drillers' logs.

Oil content.—Oil content of the sand is needed in order to determine the probable amount of recoverable oil remaining in the sand. It is more significant when expressed as barrels per acre-foot than as total content in barrels per acre. This latter presentation has been used a great deal in the past and has proved to be very misleading in many cases. For example, at one time in the Mid-Continent it was stated that any property having a total content of 15,000 bbl. per acre in place in the sand was favorable for water flooding. Such a statement is erroneous unless qualified according to net sand thickness. Such a content in 20 ft. of sand normally is favorable inasmuch as the average content would be 750 bbl. per acre-foot. On the other hand, if the sand section under consideration were 40 ft. thick the average content would be only 375 bbl. per acre-foot and probably would not be favorable for secondary recovery.

The oil content of a sand in a depleted pool in many cases may be determined directly by core analysis; however, where there is still an appreciable amount of gas in solution, together with an appreciable bottom-hole pressure, a large part of the recoverable oil is dissipated from the core before samples can be secured at the surface. In such cases the core analysis shows little more than the residual content to be expected at depletion by water flooding.

Porosity.—The porosity of the sand is determined in order to calculate oil and water saturation on a percentage basis. The main need for this results from the fact that the oil content after primary recovery, and again after depletion by secondary recovery, varies as a percentage of the pore space rather than on a straight volumetric basis such as barrels per acre-foot. For example, in a sand of any given pool the porosity may vary between 19 and 25 per cent and yet the residual-oil saturation after flooding usually will be constant, such as approximately 20 per cent, whereas the residual content expressed as barrels per acre-foot will be 280 and 388 bbl. per acre-foot respectively.

Oil and water saturation.—Percentage oil saturation, like oil content, is of primary importance in evaluating a sand for secondary recovery. If the reservoir does not contain a sufficiently high oil saturation it certainly is not adaptable to secondary recovery even though other factors are favorable. Percentage saturation at the inception of secondary-recovery operations is important in that it governs to a large degree the efficiency of recovery to be expected.

In general, in depleted sand it appears that the higher the oil saturation at inception of water flooding, the higher will be the resulting recovery efficiency and the higher the ultimate recovery under similar conditions of operation. The significance of this fact is that a sand of high oil saturation is more adaptable to flooding and, when flooded, will yield a higher economic efficiency of recovery with less water bypassing than a sand having relatively low oil saturation. Likewise a flood in a sand of high-oil saturation normally can be pushed faster, i.e., higher water-injection rates may be used without an excessive water-oil ratio than for sands of low oil saturation. This factor has been substantiated in several instances by actual field operation in the Mid-Continent, North Texas, and eastern Ohio areas.

Core-analysis data correlated with actual field results appear to confirm previous laboratory data which indicated a higher recovery efficiency with higher oil saturations. Fig. 1 shows a definite trend found in the field in the relationship between oil saturation at start of flood and recovery efficiency. The latter is defined as the percentage of total recovery indicated by laboratory flooding tests which was recovered in the field at the economic limit of operations. It is noted that the greatest variation of individual points from the curve occurs for saturation values below 34 per cent.

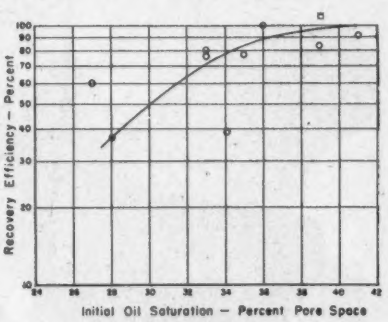

Fig. 1—Relationship between oil saturation found in cores and recovery efficiency. The recovery efficiency is defined as "the percentage of total recovery indicated by laboratory flooding tests which was recovered in the field at the economic limit of operations"

For cores from which appreciable oil has been lost it is necessary to calculate the estimated oil saturation of the sand by empirical methods. . . . While up until recently it has been necessary to rely upon oil cores cut with oil or oil-base mud to estimate connate water for flushed cores from depleted sands, it now appears that by use of the Electrodrill this value can be determined directly from cores.

*Earlougher Engineering, Tulsa. The material published here is the section "Core-Analysis Determinations" from the authors' paper given at the spring meeting of the Mid-Continent district, A.P.I. Division of Production, Tulsa, March 23-25.

This will be a tremendous advantage and should remove a lot of uncertainties which accompany the other methods.

Determination of interstitial water is also important in determining whether the sand area represented by any one core has been watered out by a flood already in action in the sand. Dickey and Bossler[1] have reported the great importance of connate water and the manner in which it apparently governs which method of secondary recovery is most adaptable. They point out that, in some areas of Pennsylvania, sands with very low oil saturation and above-average water saturation have been successfully repressured with air or gas, whereas water flooding proved an utter failure. (A high total fluid saturation may produce better results than a medium oil saturation accompanied by a low water saturation.[2])

Permeability.—The factor of permeability as commonly determined in core analyses is used as a basis for determining spacing to be employed in the field, injection pressures required, and in certain areas to determine type and size of shot. It is also one of the factors used in determining net feet of floodable sand although field data tend to indicate that it is not so important in this respect.

In some pools in certain areas of northeastern Oklahoma, eastern Kansas shallow district, and Bradford, shooting the oil sand with nitroglycerin increases the injection capacity of input wells several fold. In such cases a permeability profile can be used to considerable advantage in choosing the proper size shot. In these areas selective shooting based principally upon variation in permeability has proved helpful in reduction and prevention of bypassing. In general, in a selective shot, the practice is to use a heavy concentration of glycerin opposite the zones of low permeability with lighter concentrations opposite zones of high permeability. In several other pools it has been found in the field that a shot has relatively little effect upon the injection capacity of an input well. . . .

Permeability profiles, when used in choosing well spacing to be used in the field and for calculation of injection rates and required surface pressures, should be used with caution. It has been found that empirical data obtained from actual field injection rates for leases on which there is a large amount of core data available usually are more reliable for estimating injection capacities than the theoretical flow formulas. It also has been found that permeability variation in a sand section is far less important than might be indicated by permeability values as measured in the laboratory.

It has been common practice among many engineers to use a ratio of 10 to 1 or 20 to 1 in determining net feet of floodable sand, i.e., for a sand having maximum permeability values of 200 all sand in the section having permeability less than either 10 or 20 md. respectively would be thrown out as nonfloodable. Such a condition is not found to be the case in the field. Indications for many waterflooding operations are that sand having much greater range in permeability can be successfully flooded and substantial oil recovery is obtained from zones of very low permeability along with that from zones of high permeability. In other words, it is only in special cases where sand should be excluded from net feet of floodable sand solely on the basis of low permeability.

One of the principal reasons why range in permeability values apparently is not so important is illustrated in Fig. 2. This figure is a plot of permeability versus injectivity capacity which is defined as barrels input per day per foot-millidarcy per 1,000 psi. pressure at the sand face. This curve is based on actual field injection data for approximately 100 input wells in six different flooding projects in the Mid-Continent area. Wells were shot on only one project and relationship was similar to that for unshot wells. Complete core analyses data were available for each of the wells. Depth of sand being flooded varies

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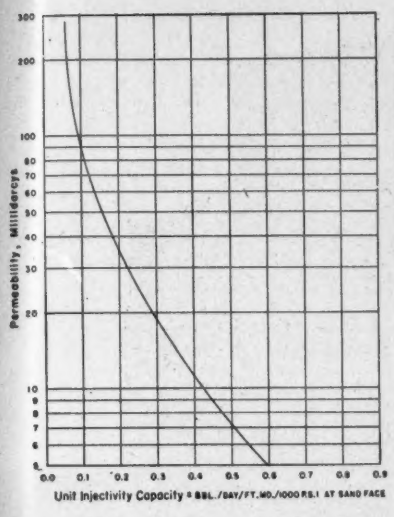


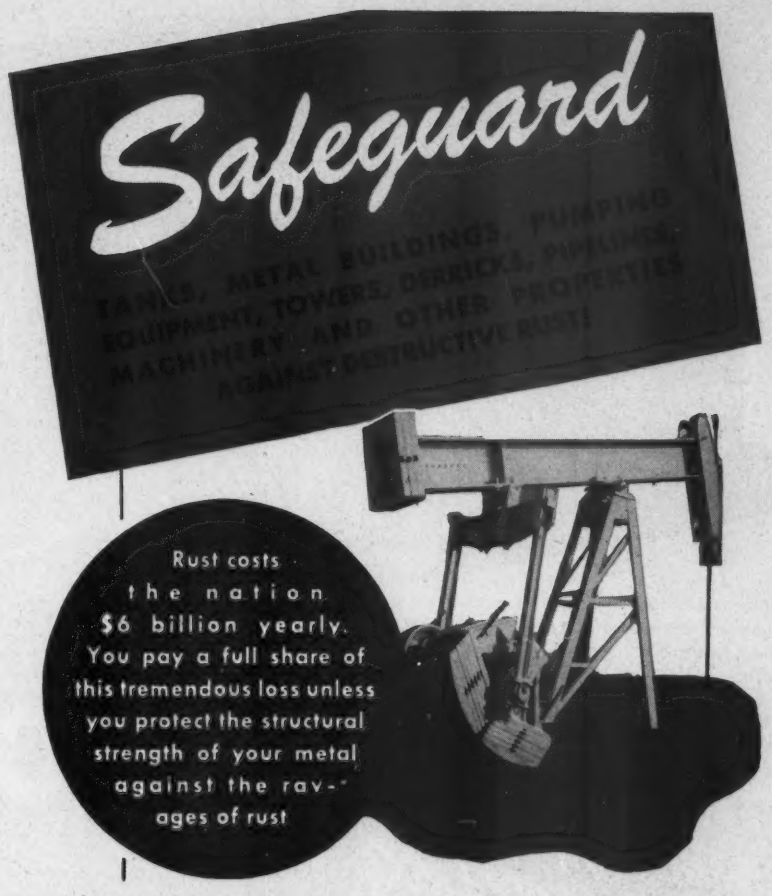
Fig. 2—Plot of permeability versus injectivity capacity, the latter being defined as "barrels input per day per foot-millidarcy per 1,000 psi. pressure at the sand face"

from 700 to 2,800 ft., oil viscosity varies from approximately 2 to 20 cp. and connate water varies from approximately 22 to 40 per cent.

The main significance of relationship indicated by Fig. 2 is the fact that the injectivity capacity of the wells having low average permeability is much higher than that for the wells having high average permeability. For example, it is to be noted that the injection rate for a well having an average permeability of 5 md. is 20 per cent of that for a well having an average permeability of 300 md.; yet, on a straight permeability relationship, it would be anticipated that the injectivity capacity of a 5-md. well should be only 1.7 per cent of that for a 300-md. well. (These results may be due to action of capillary and surface forces.[3])

The injectivity capacity will gradually decrease from time of initial injection to the point of fillup in the reservoir and then become nearly constant. In each case for wells which were used in construction of Fig. 2, the point of fillup had been reached; however, the same type of curve applies during the fillup stage although it falls to the right of the curve shown here. A family of curves can be constructed based on different cumulative injection volumes. The empirical relationship shown in Fig. 2 has been found to be very helpful in not only predicting the floodability of a sand, but also in predicting injection rates and required surface pump pressures together with well spacing which may be economically employed in the field.

Laboratory flooding tests.—Laboratory flooding tests made on fresh core samples have proved extremely valuable in the valuation of sands for water flooding. While these tests are

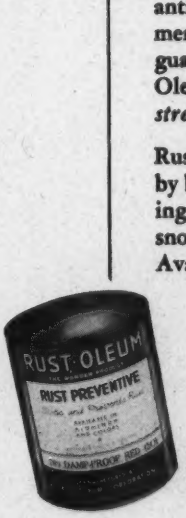

Safeguard
TANKS, METAL BUILDINGS, PUMPING EQUIPMENT, TOWERS, DERRICKS, PIPELINES, MACHINERY AND OTHER PROPERTIES AGAINST DESTRUCTIVE RUST!
Rust costs the nation $6 billion yearly. You pay a full share of this tremendous loss unless you protect the structural strength of your metal against the ravages of rust

RUST-OLEUM

Stops Rust!

In many ways, Rust-Oleum is the perfect answer to most of your rust problems. It's a proved product—an all-purpose anti-rust coating—that protects and preserves all metal equipment and surfaces. Rust can't start where Rust-Oleum safeguards metal. Even where rust has already begun, Rust-Oleum prevents further damage. It protects the *structural strength of your steel.*

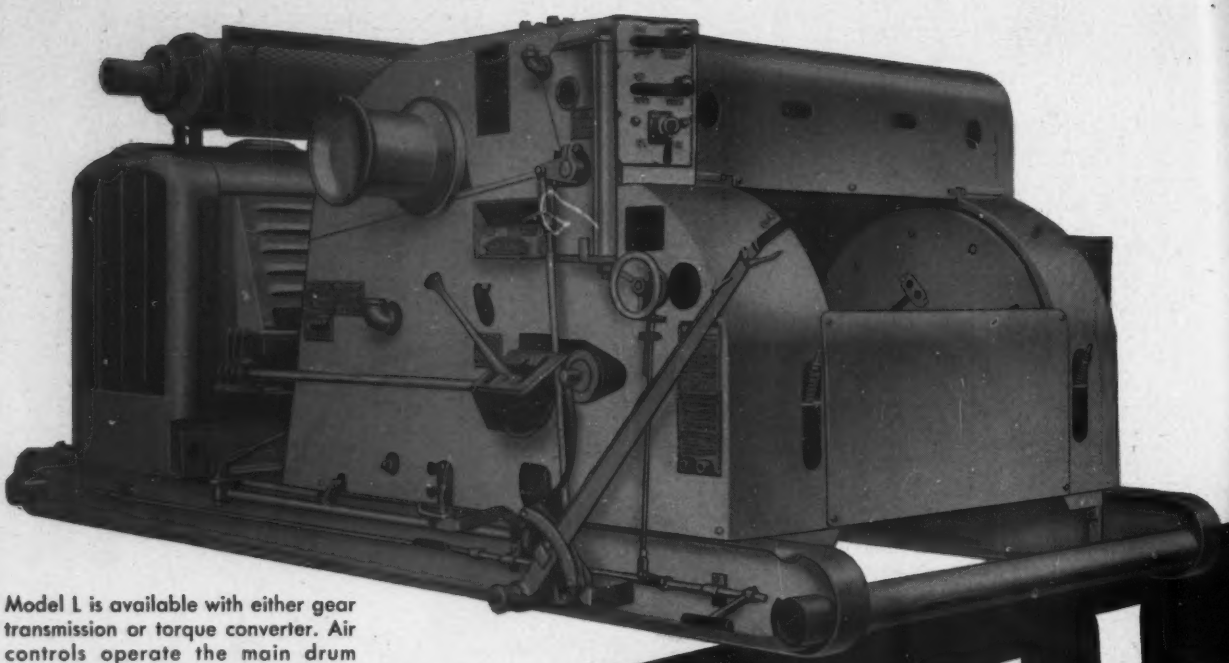
Rust-Oleum can be applied—after quick, easy preparation—by brush, dip or spray. It dries to a firm, hard, paint-like coating that combats all rust producing conditions including rain, snow, dampness, salt air, fumes and ordinary weathering. Available in all colors, aluminum, and white.



See our Catalog in Sweet's or write for full information. If you have a troublesome rust problem, give us all the details and we will make specific recommendations on how to solve it.

RUST-OLEUM CORPORATION

2469 OAKTON STREET EVANSTON, ILLINOIS



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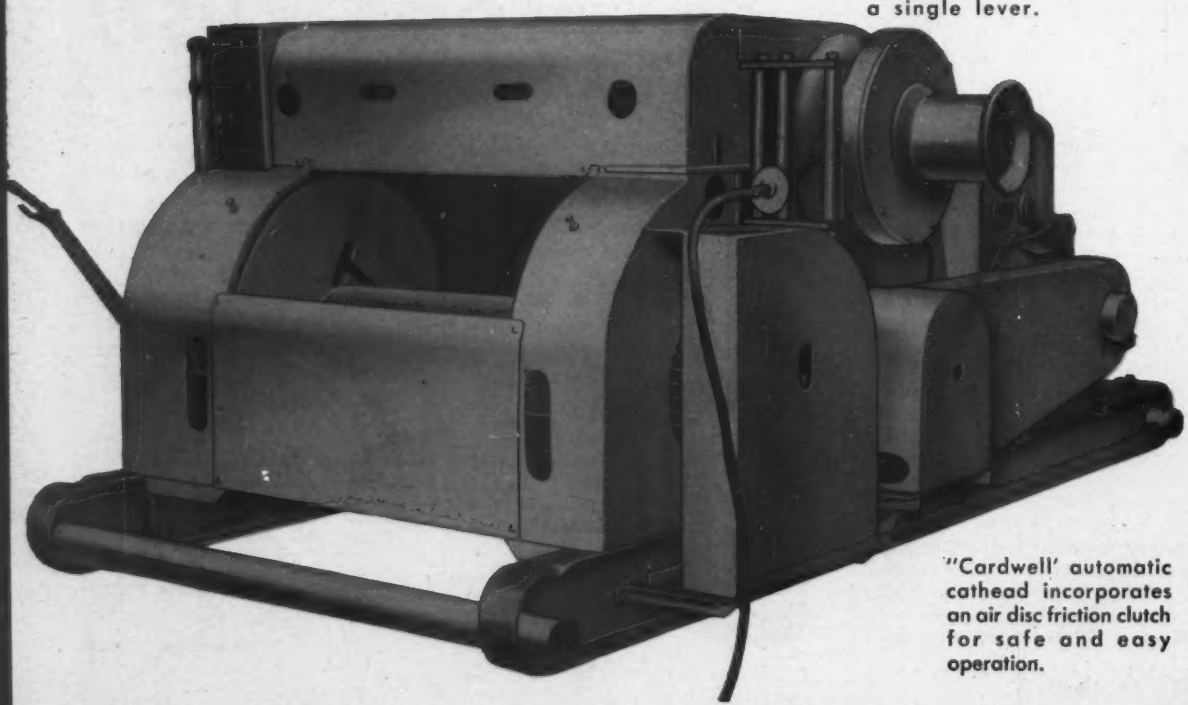

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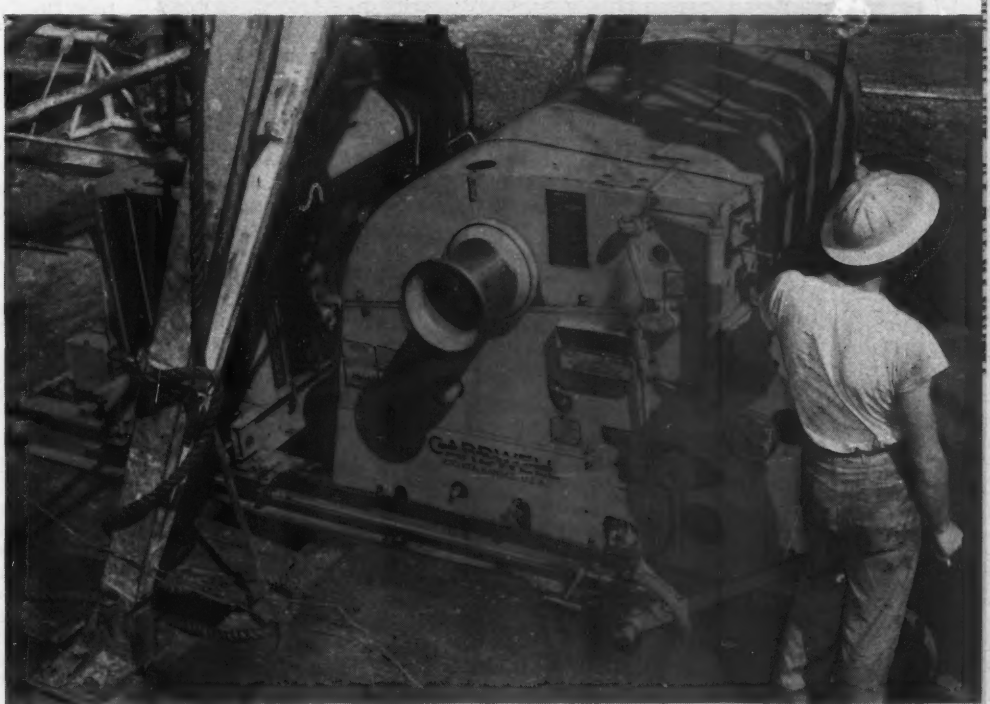

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WHEN IT'S A "CARDWELL," THERE'S NO EQUAL IN QUALITY

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For unflushed cores it is possible to estimate directly from the flood pot tests the amount of recoverable oil that should be obtained in the field. Total physically recoverable oil is determined both by measurement of oil actually flooded and recovered from the samples and also by difference between core oil content as indicated by saturation determinations and residual oil content of flood samples determined after all recoverable oil has been obtained in the laboratory. Even though flooding pressures in the laboratory of 40 psi. are commonly used, a comparison of laboratary residuals with core oil saturation for cores taken in watered-out sands indicates that the laboratory residuals are fair and dependable values.

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NO "SET-DOWN" WEIGHT REQUIRED
When desired the tubing can be suspended in tension to avoid "corkscrewing."
RESISTS CORROSION
Cast iron construction of the packer is more corrosion resistant than steel casing.
HOLDS BOTH WAYS
Two full sets of opposing slips prevent downward or upward movement of packer.
CLEAR PASSAGE THRU PACKER
for "down-hole" work. Flapper type back-pressure valve opens readily and closes positively.
MANY APPLICATIONS
including two-zone, single-zone, testing, acidizing, re-pressuring, gas lift, etc., are possible with . . .
PACKER IS FREE FROM TUBING
and is practically part of casing. Vertical movement of tubing is unrestricted.
EFFICIENT ACCESSORY EQUIPMENT
as described and illustrated in the BAKER CATALOG and the Composite Catalog.
Product No. 415-D
BAKER
RETAINER PRODUCTION PACKER

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(A.) We put it in the oven for 24 hours, at a temperature of 212° F.

(Q.) And what color drop do you call good?

(A.) Well, we don't expect to get over—say—from one to one plus color, and we certainly don't want it to get over two to two and a half to show good storage stability.

(Q.) What kind of stock do you use?

(A.) No. 2 cat-cracked gas oil.

(Q.) Do other of you operators have a color stability test on your stock?

(A.) Well, I might say that on our kerosine we use a peroxide method. It's been very difficult, if not impossible, to correlate the peroxide coloring test with long-time storage tests. About the only answer you get from the peroxide test is if it passes, you're pretty sure it's good. If it doesn't pass, you don't know where you are.

(Q.) Describe that test, please.

(A.) As I recall, we use benzol peroxide. I think we use 1 cc. of that solution in a pint or thereabouts, and hold it at 122° for about 3 hours and determine the color. If the color is below 25, it's positive, and we don't consider it color stable.

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As can be seen from the foregoing, maximum precipitation will occur if a sour virgin gas oil is doctor sweetened and then blended with a cracked gas oil. It is suggested in some cases that the gas oils be blended and stored as long as possible within the refinery and then filtered immediately before sale. In many cases there has been a marked improvement even after as short a storage period as 48 hours.

(Q.) Has anyone had experience with vapor phase treating thermally cracked gas oil?

(A.) Well, one company was treating a blend of it, and from the information insofar as the properties were concerned, it was definitely good, because of the increased vaporizing qualities.

Q. Can you make a No. 1 furnace oil out of No. 2?

(A.) Catalytic or thermal distillates do not make satisfactory fuels for pot-type burners. Burners of this type depend upon natural draft for air supply and the oil is cracked in the burner. Under these conditions fuels, with high aromatic contents, burn poorly.

(Q.) What would happen if sweet crudes and sour crudes were mixed? Would the cracked part through precipitation be as bad as it would be if you mixed the two gas oils or burning oils?

(A.) The mixing of sweet and sour charging stocks to cracking units will, in itself, not tend to cause this type of precipitate formation. This is probably due to the destruction of sulfur compounds, such as disulfides, under cracking conditions.

(Q.) So your whole point there is that the sulfur has a lot to do with this problem, both sludge formation, or precipitation or color stability also?

(A.) That is correct insofar as precipitation is concerned, although I do not believe that sulfur has a direct effect on color stability.

(A.) One point in caustic washing cracked oil petroleum hydrocarbons applies to the furnace oils as well as it does to the butane. Five Baume caustic forms a water-soluble sodium soap, while if you use a 15 Baume caustic it forms an oil-soluble soap, and oftentimes if you have just a weak caustic ahead of any other treatment, it will prevent those soaps from staying in the oil. It's practically impossible even to take them out with clay afterwards, as there is with a heavy caustic in the beginning.

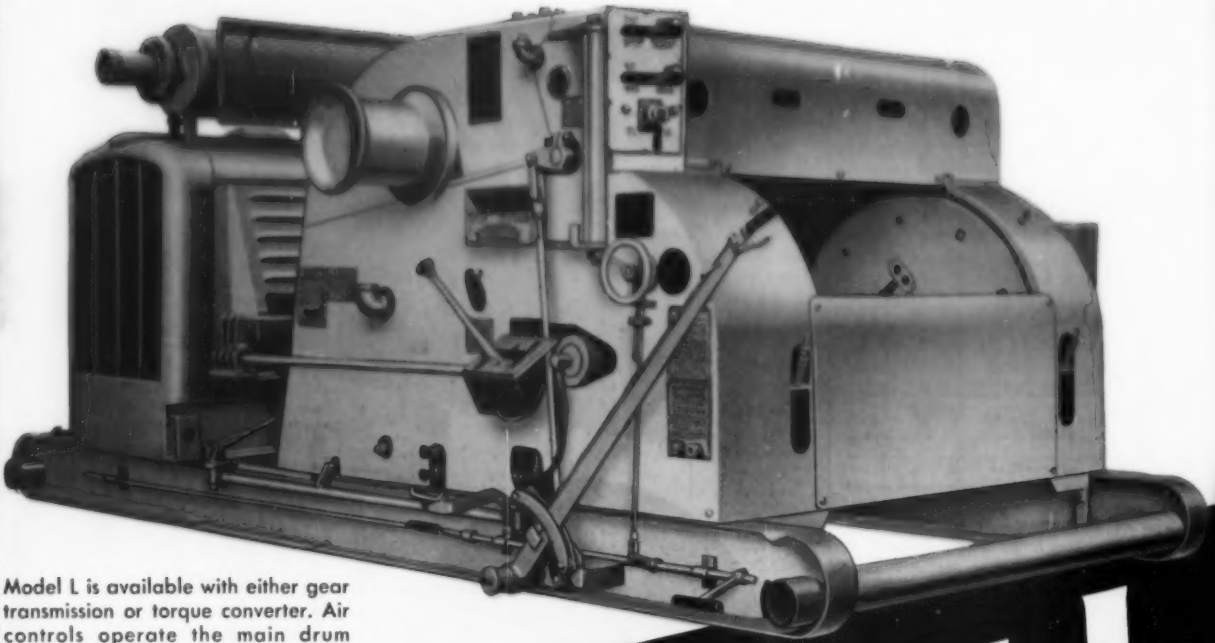
(A.) In our caustic washing we find that by using a 20 Baume caustic we get a more stable color by not having a water wash after the caustic.

WHAT means are available for disposal of residual fuel oils in face of the vanishing markets for such oils?

(A.) Some of these problems are not particularly new. We had some bad ones in the late twenties—we had to do some awful things—and I hear that some people are thinking of doing the same thing today. That is, running it down to pitch and dumping it into the yard.

Some are looking again into coking now. Others are trying to get in on

*From a "Questions and Answers Session" featured at the Western Petroleum Refiners Association's recent regional technical meeting, Shreveport.



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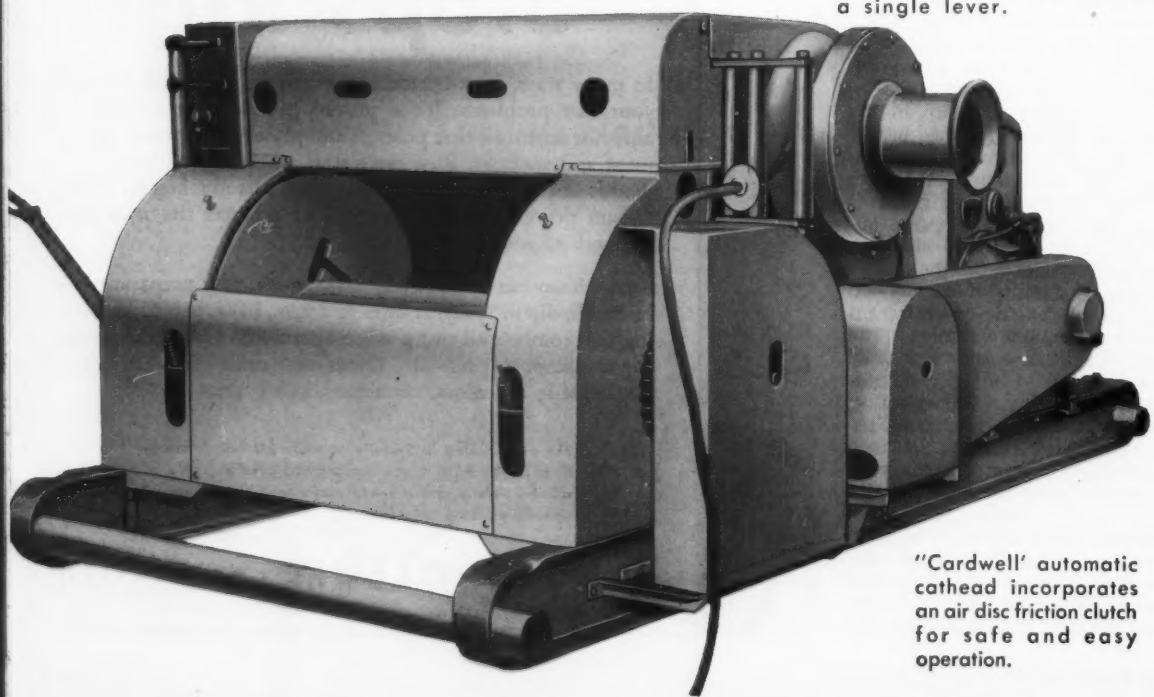

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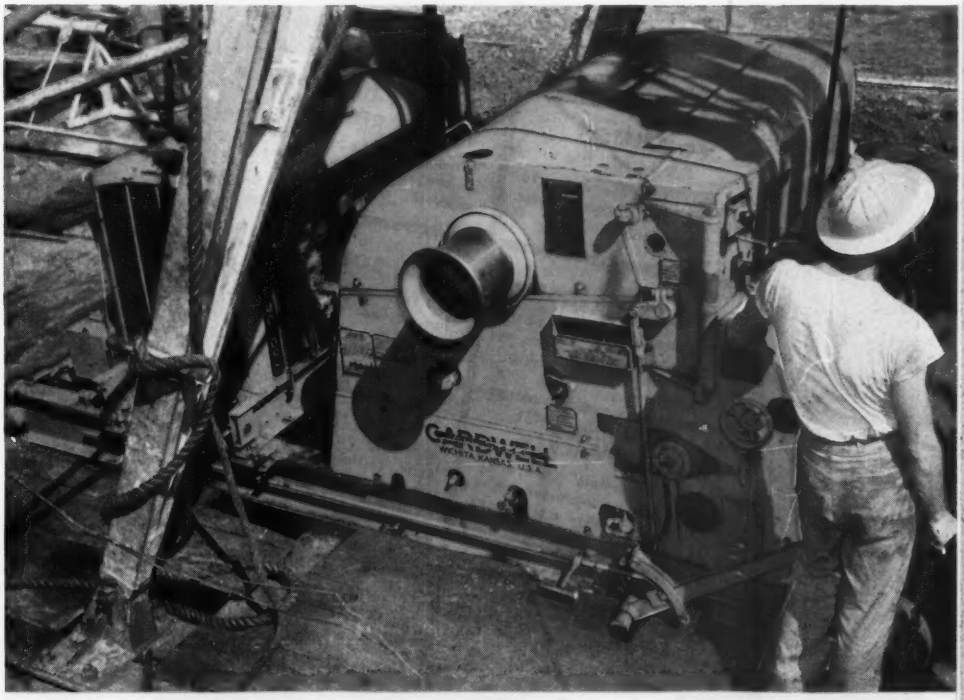

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As can be seen from the foregoing, maximum precipitation will occur if a sour virgin gas oil is doctor sweetened and then blended with a cracked gas oil. It is suggested in some cases that the gas oils be blended and stored as long as possible within the refinery and then filtered immediately before sale. In many cases there has been a marked improvement even after as short a storage period as 48 hours.

(Q.) Has anyone had experience with vapor phase treating thermally cracked gas oil?

(A.) Well, one company was treating a blend of it, and from the information insofar as the properties were concerned, it was definitely good, because of the increased vaporizing qualities.

Q. Can you make a No. 1 furnace oil out of No. 2?

(A.) Catalytic or thermal distillates do not make satisfactory fuels for pot-type burners. Burners of this type depend upon natural draft for air supply and the oil is cracked in the burner. Under these conditions fuels, with high aromatic contents, burn poorly.

(Q.) What would happen if sweet crudes and sour crudes were mixed? Would the cracked part through precipitation be as bad as it would be if you mixed the two gas oils or burning oils?

(A.) The mixing of sweet and sour charging stocks to cracking units will, in itself, not tend to cause this type of precipitate formation. This is probably due to the destruction of sulfur compounds, such as disulfides, under cracking conditions.

(Q.) So your whole point there is that the sulfur has a lot to do with this problem, both sludge formation, or precipitation or color stability also?

(A.) That is correct insofar as precipitation is concerned, although I do not believe that sulfur has a direct effect on color stability.

(A.) One point in caustic washing cracked oil petroleum hydrocarbons applies to the furnace oils as well as it does to the butane. Five Baume caustic forms a water-soluble sodium soap, while if you use a 15 Baume caustic it forms an oil-soluble soap, and oftentimes if you have just a weak caustic ahead of any other treatment, it will prevent those soaps from staying in the oil. It's practically impossible even to take them out with clay afterwards, as there is with a heavy caustic in the beginning.

(A.) In our caustic washing we find that by using a 20 Baume caustic we get a more stable color by not having a water wash after the caustic.

WHAT means are available for disposal of residual fuel oils in face of the vanishing markets for such oils?

(A.) Some of these problems are not particularly new. We had some bad ones in the late twenties—we had to do some awful things—and I hear that some people are thinking of doing the same thing today. That is, running it down to pitch and dumping it into the yard.

Some are looking again into coking now. Others are trying to get in on

*From a "Questions and Answers Session" featured at the Western Petroleum Refiners Association's recent regional technical meeting, Shreveport.

the market for asphalt. I suppose every individual refiner has a problem of his own affecting his economics in this respect. It is not easy. I think that the easiest solution is to get hold of crude oil that has no fuel oil. (Laughter).

This is a big problem, and you can't laugh it away. It is the biggest economic problem facing the oil industry today. It's an individual problem, which probably has affected the economics of the refining industry more than any one thing that has happened in 15 years.

(A.) That's a market that is a little bit hard to change the demand for, if I'm correct.

(A.) Today the market on fuel oil in some areas is as low as $1.05, and refiners are paying $2.56 for the average gravity crude. You can't operate for a long time on that basis, while the other products are not absorbing the difference.

(Q.) Doesn't catalytic cracking reduce fuel-oil yield to the extent that with more and more going to cat cracking the volume of residual fuel oil will be less?

This is a good point, and perhaps someone would like to add a word or two to that about difference in yield, let's say, between cat cracking and thermal cracking just to emphasize that point.

(A.) By substituting cat cracking for thermal cracking there will be a reduction of heavy fuel oil and an increase in gasoline. We've studied a number of refineries, and of course every refining situation is different, but the No. 6 fuel production can be cut almost in half. If you put a coker in front of the cat cracker, it would be even more than that. You can use coking to prepare feed stock for catalytic cracking.

The method of feed-stock preparation, of course, influences gasoline and fuel-oil yields. There are other methods, such as vacuum reduction, that will also give you a lot of feed stock for cat cracking, and we've found that vis-breaking is also good to cut the production of fuel oil and increase feed stock for cat cracking. It's very hard to generalize; you have to study each refinery situation.

(A.) A couple of weeks ago the W.P.R.A. put out some statistics on railroad fuel consumption, and just out of curiosity I converted those to a B.t.u. basis, and during the year 1948 the railroads averaged paying $5.10 a ton for coal they burned. At that figure fuel oil would break even with them at $1.25 a barrel, which gives you some idea of what you're facing in selling this material.

(A.) If many individual refiners check up, they will find that when they make coke they've had the fun of making it, because they may get down to the place where there may be a market for or even competition facing the interior refinery, plus the cost of making the coke. As I see it, it comes out with a negative figure. Of course, a refiner located in the area of consumption has a big advantage and he can drop the price and push the other fellow out. It is a pretty simple proposition for a refinery running 10,000 or 15,000 bbl. crude to put in a coking unit, and he might find it smart to do that.

Instrument Society Meeting Set for May 12 in Toronto

The fourth spring meeting of Instrument Society of America has been set for May 12 at Royal York Hotel in Toronto, Ont., Canada, and several papers pertaining to chemical-process instrumentation and application of instruments in the petroleum industry have been prepared.

Included will be a paper on "Unit Start-Up and Problems of the Instrument Engineer," by W. J. Graeb, Imperial Oil, Ltd., Sarnia, Ont.; a paper on "Instrument - Department Organization in Process Industries," by R. J. S. Pigott, Gulf Research & Development Co., Pittsburgh (open discussion); and "Instrumentation of a Typical Chemical Process," by C. W. Hills, Shawinigan Chemicals, Ltd., Shawinigan Falls, Que.

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Mechanical Aspects of

PIPE-LINE COATINGS

by L. F. Sherer and O. C. Mudd†*

TO prevent corrosion is the prime reason for coating buried metal structures. All corrosion is electrochemical action. The soils in which most metal structures are buried contain moisture or water with dissolved natural chemicals. In some locations these have been altered by absorption of fertilizers, industrial wastes, and/or petroleum. Corrosion of metal by contact of soil proceeds only when the latter is moist. Corrosion can be prevented by insulating the metal from the moist soil or by nullifying the latter's electrolytic action. . .

In recent years industry has generally concluded that coating protection of some form should be provided on new pipe-line installations.

No practical pipe-insulating material has been found which will stay completely stable and moistureproof in the soil over an extended period. The economical alternative is to apply one which will remain reasonably stable under soil pressure and which has a low moisture-absorption rate (thus retaining an acceptable insulating value) and to compensate for its imperfections by applying cathodic protection. The latter's protective currents decompose any moisture (that may reach the pipe face) into gaseous components which escape through the coating flaws.

Characteristics of Good Coating Material

Certain properties are essential in every good coating. These are:

1. Low moisture absorption.
2. Good electrical insulation.
3. Insolubility in petroleum products.
4. Resistance to soil pressure and deformation.
5. Ease of application.
6. Inertness to soil chemicals.

Excellent results—in fact, almost perfect results—can be obtained from a proper combination of materials, and modern methods of application and burial of the coated line.

Evaluation of Various Types of Coatings

The American Petroleum Institute initiated a program of coating tests during 1930, which extended over 10 years.

*Chief engineer, The Texas Pipe Line Co., Houston. †Chief corrosion engineer, Shell Pipe Line Corp., Houston. Portion of paper presented at twenty-eighth annual A.P.I. meeting, Chicago, and recently released for publication.

These A.P.I. tests and other full-scale tests and observations made concurrently and since under actual operating conditions, different ages and types of coatings in service on lines up to 10 in. in diameter were studied to determine the better materials and methods of application promising longest coating life with respect to cost. A brief resume of coating materials tested and results obtained are:

1. **Asphalt and coal tar in solvents.**—Offered little or no protection.

2. **Asphalt emulsions.**—Highly permeable to moisture, and under some conditions served to harbor highly corrosive fluids between coating and pipe, thus accelerating corrosion.

3. **Asphalt enamel with cocoa-fiber reinforcing.**—Moisture entered through the porous fiber structure, and it was common in later inspection to find an imprint of the reinforcing fabric pattern corroded on the pipe surface.

4. **Petroleum-base or grease-type coatings.**—These have very poor electrical insulating properties after a short time in moist soil. Loss of electrical resistance has been found to be an index of their moisture absorption. Moisture accumulates in small globules at the metal surface, thus activating corrosion. Corrosion found under such coatings has been uniformly spread to the extent that, when a leak develops, it may be impossible to apply a patch and clamps, or even to weld the patch.

5. **Multilayer coatings where asphalt or coal tar, with organic or semi-organic wrapper, is applied in successive layers.**—These proved less effective than a single coat with protective wrapper. The embedded felts contained solvents or moisture which evaporated into gas or steam when the succeeding coat of hot enamel was applied, thus causing large voids in the coating. These often accumulated water that followed flaws to the pipe surface, and caused concentrated corrosion and early leaks.

6. **Asphalt mastic.**—Some of these have resisted corrosion for many years in soils free of petroleum or similar solvents. However, crude oil or its products, such as may enter the soil from new or old line leaks, rapidly dissolve these asphalt mastics. In one case on a products line, about 300 ft. of coating was destroyed before the leaking product was visible at the ground surface. Also they are quickly destroyed by marine animals in brackish waters. Because of the permeability of the asphalt, loss of bond between pipe and coating has been observed at many places in wet soils.

7. **Asphalt enamels, with and without wrapper.**—Asphalt enamels, even at or near atmospheric temperatures, will flow slowly under pressure. Their tendency to flow decreases with temperature. Asphalt enamels are relatively permeable to moisture; in fact, they often absorb and trap enough water to expand the coating and sever its bond to the pipe. They are soluble in petroleum and similar solvents. Asphalt without wrapper can be severely damaged by soil; also it tolerates vegetation-root growth along the surface and occasionally into it. In some parts of the country this type of coating may be severely damaged by gophers.

Even with cathodic protection, severe corrosion has been found under asphalt enamel with a protective wrapper, because the expanded coating had interrupted the flow of protective current and left the pipe surface under conditions equivalent to bare pipe in corrosive soil. The mechanical difficulties encountered in handling a line with this type of protection in warm weather, even though the coating has been well reinforced, make it almost impossible to have a well insulated job without unreasonable cost.

8. **Coal-tar enamel, with and without wrapper.**—Coal-tar enamels without wrapper also are subject to severe distortion by soil movement; some fat soils, when shrinking, have frequently pulled the enamel from the pipe surface. The addition of a wrapper of asbestos-felt retards movement or removal of enamel by soil shrinkage, and it reduces the deformation of the enamel by soil pressure; however, in some cases the repeated changes of soil dimensions with moisture change have displaced the enamel until the asbestos-felt touched the pipe and provided a moisture path to the metal. No evidence of dimensional change in coal-tar enamels by water absorption alone has been observed.

A 4-mile section of a 10-in. crude-oil pipe line laid in 1928, coated with coal-tar enamel but without a wrapper, was reconditioned during 1936 because of severe corrosion. This section was recoated with coal-tar enamel, hand-ragged, plus a hand-applied spiral wrapper of asbestos-felt wrapped on cold. All holidays were detected and patched before the wrapper was applied. The section was given cathodic protection, and successive electrical measurements showed no apparent decrease in coating effectiveness.

Two thousand feet of this coating was removed during 1946 to examine the condition after 10 years of service. The pipe surface showed no corrosion and no loss of coating bond, even though holidays were numerous. Cold flow of the enamel was much in evidence, the areas of greatest thickness having suffered most. Those of approximately $\frac{1}{16}$-in. thickness had been deformed the least and appeared in the best condition. Evidence was found of pipe movement longitudinally within the coating, although this had not severed the bond.

Recent Developments in Coating Technique

The evidence showed that a single flood-coat of coal-tar enamel, machine-applied, when supplemented with cathodic protection, gave best results with respect to cost. It also showed that much coating damage is caused by poor trench preparation before lowering pipe and by carelessness in lowering and backfilling.

The improvements indicated by the evidence, and since developed, include the following:

1. Addition of suitable reinforcing material to impede cold flow.

2. Detection and patching of all holidays before pipe is lowered into trench.

3. Thorough preparation of trench: (a) by removal of all materials, debris or objects liable to cause excessive

pressure against the coating; and, (b), by laying along the trench bottom sufficient fine-textured soil or sand to give uniform weight distribution after the pipe is lowered.

4. Exercising of care when lowering in.

5. Lowering in of the coated line direct from the coating machine, when possible, thus avoiding damage from trench skids.

6. Use of a fine soil, free of hard objects, for the first part of the backfill.

7. Exercise of care to prevent debris from falling or being thrown into the open trench or backfill at any time.

8. Application of cathodic protection as soon as possible after line is backfilled.

Coating Reinforcement

Suitable reinforcing material to retard cold flow in bitumen coatings must be nonhygroscopic; i.e., it must not absorb or conduct moisture. Glass fiber matting is the most practical material now available at reasonable cost. A mat of 15-mm. (0.015-in.) thickness has given best results for coatings on pipe 12 in. or less in diameter. It should be wrapped into the hot enamel because, if hot enamel is applied over a wrap of dry matting, many air voids and holidays occur. The best results are obtained when the mat is completely embedded in the hot enamel as near the outside surface as practical, and asbestos-felt is wrapped immediately over this coating.

Coatings capable of withstanding severe abrasion and shock can be obtained by mounting short sections or joints on dollies, rotating them, and applying three successive layers of hot enamel with 15-mm. glass-fiber mat pulled in. If such pipe is to be pushed into position through casings, under highways or railroads, or across streams, it is advantageous to build up "abrasion pads" every few feet over the described triple-layer coating. These pads should be of single-mat width and several layers thick, saturated with hot enamel while the pipe is being rotated. The pads act to absorb abrasion or displace sharp objects during the pushing operation, and they may even help "dig trench" in a pipe pushed or pulled across streams.

Holiday detection and patching of all coating holidays are as essential as testing the line for weld or metal imperfections. Continuity of metal keeps the oil in the line; continuity of coating keeps the metal in place.

Proper preparation of the trench before lowering the coated line is a conservation measure. Because bitumen coatings, even with reinforcement, are subject to cold-flow deformation when the pressure is great enough, it is obvious that pressure against the coated surface should be distributed as evenly as practical.

This feature becomes of increasing importance in rock trenches or hard soil, or with larger-diameter lines where the unit loading is relatively higher. A novel method for handling this situation was used on a recently constructed large-diameter line. Fine materials for cushioning were scarce; therefore, such material as was available was placed in piles about 6 in. high and at intervals of approximately 50 ft. in the bottom of the trench. Several pounds of hot tar from a small patching pot were poured on the top of each pile before the pipe was lowered in. This method proved most effective.

Much damage has been done to coatings during the lowering-in operation by allowing the line to swing against or drag on sharp projections along the trench walls. Large sheets of plywood placed along these walls during lowering will minimize such damage. These sheets should be held in place until the line is secure against further movement, after which they can be transferred ahead.

With proper reinforcing and reasonably careful handling, it is now entirely practical to lower a coated line directly into the trench behind the coating machine, thus saving considerable expense in further handling of the line and in repair to skid marks.

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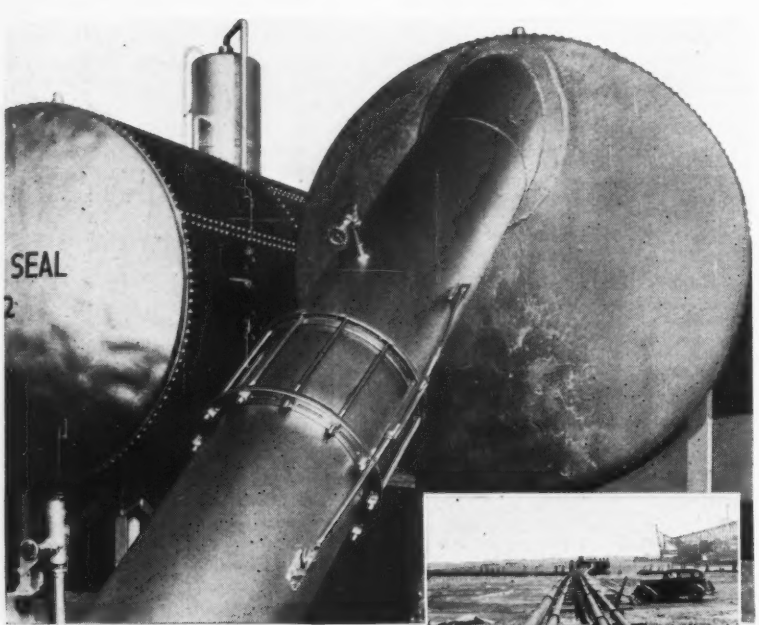

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Frequently too little attention is given to the backfill operation, and large clods or rocks often are pushed in with the first part of the backfill. Too much stress cannot be placed on the damage which may result to the coating from inattention to this feature.

As a good practice in handling "slack loops," the trench should have objectionable material removed before picking up the loop. After picking up, repair the skid marks and then holiday-detect the exposed coating to verify its continuity. Then lower into the line and backfill with care equal to that given the remainder of the line.

Application of cathodic protection to coated pipe as soon as possible after it is laid will effect the least consumption of electrical energy for complete protection; and will insure against any start of corrosion where undetected holidays remain.

Coating Larger-Diameter Lines

Present trends are toward construction of larger-diameter oil lines and, as mentioned previously, their coatings are subjected to greater pressure along the underside supporting area.

A 20 to 22-in. line recently laid from Jal, N. M., to Wichita Falls, Tex., via Midland, was coated with coal-tar enamel, glass-fiber reinforcing, and asbestos-felt wrapper. It was deemed advisable to use 25-mm. glass-fiber reinforcing in this coating for added insurance against cold flow under the weight of this large pipe when filled with oil. It was not considered practical to embed this 25-mm. glass into a single flood coat; therefore, a double-coat double-wrap traveling machine applied an initial flood coat, followed by the reinforcing of glass fiber, and a second flood coat followed by a wrapper of 15-lb. asbestos-felt. The average thickness of the complete coating was less than ¼ in.

A scrupulous inspection for holidays was maintained immediately behind the coating machine; holidays were patched as rapidly as they were detected. A 4-mile section of line was checked for coating resistance a few days after backfilling. It measured more than 24 megohms per square foot, which resistance undoubtedly decreased after complete settlement of the backfill. Nevertheless, that measurement indicated that a good job had been done.

A commercial form of casing spacers, designed to hold the pipe centered in the casing, was installed over the sections of coated pipe that were pushed through casings at road crossings, etc. These spacers were constructed of synthetic blocks, suitably shaped and arranged on flexible metallic cable, with provision to maintain equality of spacing and tight attachment around the coated pipe.

These assemblies, which were fastened around the pipe at 15-ft. intervals, proved very effective in centering the pipe within the casing, so that much less effort was required for the pull. They also eliminated the likelihood of wood or other fibrous material, loose wires, etc., being left within the casing.

Preparation of Pipe for Coating

It is important that pipe to be coated should be as clean as possible so that it will bond properly with the coating. New pipe can usually be prepared for coating primer and for the succeeding hot enamel application without much trouble; however, proper cleaning of old pipe removed from the ground presents many problems.

Rotary-head traveling cleaning machines are still the favorites. With these it has been found that better cleaning of rough pipe is possible if one cutter-head rotates in a clockwise direction and a second cutter-head rotates counterclockwise. Such an arrangement seems best adapted for cleaning out deep pits or along rough-edged longitudinal welds on certain types of pipe.

In preparing pipe surface for coating, it is important to remove loose soil and corrosion products or scale, but it is even more important to remove all moisture from adhering

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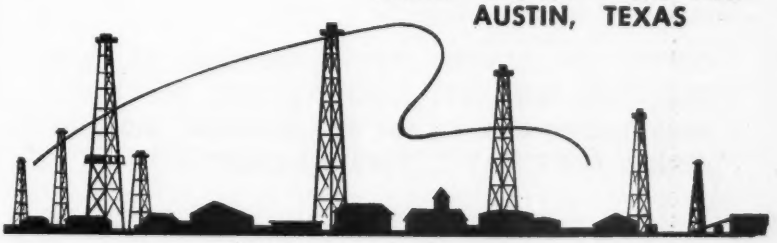

substances. Cleaning of the base metal accomplishes this, but the removal of moisture by chemical methods is cheaper.

Rough corroded surfaces, reasonably cleaned and chemically treated, have provided excellent bond for hot enamel coatings. In one method of cleaning now in vogue, a rotary-head cleaning machine is run to remove dirt and scale prior to inspection for corrosion damage and subsequent repair.

After the repair work, a second machine, with cleaning head to remove additional loose scale, and with brushes to apply a solution of dilute primer (diluted with four parts of thinner) to soak any remaining rust or scale, is run. This does not remove all of the moisture, but the amount left will not cause trouble. Its effectiveness is often shown by the appearance of chemicals over the treated surface after the primer dries.

A third machine is then run over the treated surface. This machine is fitted with a cleaning head to remove any scale loosened by the dehydrating action of the dilute primer and with brushes to apply the regular or full-strength primer.

Other methods of cleaning may be justified by circumstances. On some older lines uncovered for reconditioning, corrosion products have been found that gave trouble even after treatment with primer solution. In some such exceptional cases the trouble was eliminated only by "grit blasting."

Checking Coatings in Place Underground

Two methods are now popular to verify effectiveness of coating underground. One method is an electrical-resistance test which can be made only when the coated pipe is electrically isolated from other structures intimately in contact with ground.

The other method of testing coating in the ground is by the use of the Pearson holiday detector, which locates the coating flaws by detecting the points of current flow from the soil into the pipe.

Experience has developed coating specifications for new construction or maintenance jobs, with provisions aimed to obtain best results. However, these are without force unless constant vigilance is maintained by inspectors qualified to judge the character of the work and authorized to enforce compliance.

BOOKS

SYMPOSIUM ON USEFULNESS AND LIMITATIONS OF SAMPLES. Published by American Society for Testing Materials, 1916 Race Street, Philadelphia. 40 pp. $1.

This booklet is an authorized reprint of papers presented at the fifty-first annual meeting of the society at Detroit last June. Papers in the booklet include "Sampling and Its Uncertainties," "On Variations in Materials, Testing, and Sample Size," and "The Amount of Inspection as a Function of Control of Quality." The symposium at which they were presented was sponsored by Committee E-11 on Quality Control of Materials.

TEXAS PETROLEUM DIRECTORY, 1949. Published by Petroleum Personnel Research, 508 Richmond, Houston. 288 pp. $10.

This edition, edited by R. V. Logan, covers 215 Texas cities, 163 of which are county seats. It contains over 34,000 listings of companies and individuals connected with the Texas oil industry. Listings include street address and telephone number. In addition, elevations are given for each town and city.

PETROLEUM PRODUCTION-OIL PRODUCTION BY GAS AND FLOODING, Vol. 5. By Park J. Jones. Published by Reinhold Publishing Corp. 274 pp. $6.00.

Fifth and concluding volume of an extensive review on petroleum production, this book discusses reservoir characteristics, gas displacement of oil, plant extraction, vaporization, pressure maintenance, flooding, and oil production by gas. The appendix contains tables giving a practical approach to estimating vaporization in oil reservoirs, separation of oil and gas, and the prospective g.p.m. content in a gas to be processed in a natural-gasoline plant with the aid of K values. Published data on equilibrium constants were correlated with the K values obtained from separator data in numerous fields. The results are submitted as tentative K values for dark crude oil. Applications of K values to separation, gas-oil ratios, and g.p.m. content are illustrated in the book.

The test is accompanied by easily read graphs and charts.

WEAR AS APPLIED PARTICULARLY TO CYLINDERS AND PISTON RINGS. By Dr. F. P. Bundy, T. E. Eagan, and Ralph L. Boyer. Published by Kokosing Press, Mount Vernon, N. Y. 129 pp. $3.50.

This book contains the findings of a 10-year research effort by Cooper-Bessemer Corp. of Mount Vernon, Ohio, devoted to reducing cylinder and piston-ring wear in engines. The principles put forth are basic and broad enough in application to be of interest to builders and large-scale users of engines, allied equipment, and heavy machinery.

The sections of the book were prepared by three directors of the research program. They were: Dr. F. P. Bundy, now with General Electric Co.'s research laboratory, who directed the theoretical research and laboratory experimentation; T. E. Eagan, chief metallurgist of Cooper-Bessemer, who conducted the metallurgical studies; and Ralph L. Boyer, vice president and chief engineer of Cooper-Bessemer, who guided the application of the principles, uncovered in the wear study, to improved engine design.

Complex laboratory equipment described in the book and especially built for the wear study is believed to be the only equipment of its kind in existence today. This equipment duplicates conditions actually encountered inside of engines even to the point of varying the operating pressure throughout a cycle just as it occurs inside the actual engine cylinder.

BIBLIOGRAPHY ON X-RAY STRESS ANALYSIS WITH SUBJECT INDEX. By Herbert R. Isenburger. Published by St. John X-Ray Laboratory, Califon, N. J. 17 pp. $3.00.

Handy reference booklet containing 10 pages of bibliography with names of books on X-ray analysis and allied works arranged by author, title, volume, and page numbers. A total of 204 references is included. In addition a four-page subject index is provided for readers.

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Reclaiming Oil, Again —Part 1

I should like to know of the extent of reclamation of used engine oils and motor oils. Is it possible to restore the oils to good quality? What are the details of the processes?—P. H. H.

Little has been published on the reclamation of used lubricating oils, except regarding the cleaning of them by circulation through filters, etc., as a part of large engine installations. The reason for the lack of literature is the wide diversity of methods or equipment that may be employed, coupled with the fact that lubricating-oil blending stocks can be purchased in bulk (tank-car) quantities for a price lower than the cost of reclaiming unless the reclaiming operation is exceedingly simple and somewhat inadequate. Of course, if operations are undertaken on a very large scale, such as 5,000-10,000 bbl. per month, the reclaiming business (gathering, recovery, and distribution) will be directly competitive with petroleum refining. Occasionally, in short periods of business upset, such as 1932-1935 when neutral oils were scarce, or during World War II, reclaiming is particularly profitable.

Factors in Reclaiming

Inquiries are received so frequently by this department (with never an entirely satisfactory answer being possible) that it was decided here to answer the question somewhat fully. The most generally useful suggestion to those interested in reclaiming oils would be to (1) locate or develop an extensive assured market, (2) buy storage tanks for holding tank-car lots, (3) install simple blending and packaging equipment, and (4) purchase neutral oils (light or thin lubricating-oil stocks) and bright stock (heavy or heavy lubricating-oil stocks). As an alternate, they can install somewhat inadequate simple reclaiming processes and operate on a small scale selling a somewhat inferior product; or they can install extensive equipment, operate on a large scale, and by advertising they can possibly sell the product in direct competition with regular oils or perhaps at a premium price. The wide variety of possibilities will be evident under the topic of impurities, and in next week's issue of this page the topic of processing will indicate the several ways of reclaiming oils.

Quality.—Fundamentally, the quality can be anything that the operator is willing to pay for. Obviously, the better the quality the more the plant will cost and the greater will be the cost of operations. If the reclaiming operations are as complete as those employed in a refinery, there is no reason why the oils should not be equal or superior to newly manufactured oils. Some technologists and some refiners feel that completely reclaimed oils are probably superior to newly manufactured oils because in some degree they have already been exposed during use in the engine, to conditions that would, in part, eliminate or destroy the least suitable parts of the oil. However, reclaiming plants seldom are complete enough to produce a superior oil. For some purposes partially re-refined oils (filtered) are satisfactory, but they can hardly be considered as superior.

Impurities.—The general types of impurities that accumulate in used oils are:

1. Solid debris—dirt, dust, sand, grit, metal particles, corrosion scale, lead fluid remnants, carbon, etc. These materials are highly detrimental.

2. Oxidation and heat products—long exposure to heat in the presence of even small amounts of oxygen and metal particles which act as catalysts, causes the formation of sludge or asphaltic material and a rise in viscosity (of the lubricating oil proper). Paraffin-base oils tend to accumulate asphaltic material in solution, increase greatly in viscosity, form varnish-like deposits as they "cook down," and finally produce hard carbon deposits. Naphthene or detergency-type oils form a sludge (semisolid) rather than soluble asphaltic material and therefore do not cause as dense deposits of carbon nor increase so greatly the viscosity of the oil. However, the sludge can settle out and plug lubrication lines. Corrosive materials accumulate in the oil. Most of the oils marketed today contain one or several addition agents which in part alleviate the difficulties just enumerated.

3. Volatile material—this consists of the highest boiling parts of the gasoline, and possibly the polymers of certain diolefin or olefinic hydrocarbons, that are derived from cracked gasoline. This is the crankcase dilution that always occurs in engines. Such material is fundamentally not harmful but, of course, it is not lubricating oil and should not be sold as such. It also dilutes the oil, ruining the flash point, and reducing the viscosity of the whole mixture.

(Processing methods will be discussed in next week's issue of this poge.)

Composition of Lead Fluid

What is the composition of tetraethyl lead?—R. C. A.

The main components of tetraethyl lead fluid are ethylene dibromide, dye (and impurities), and, of course, tetraethyl lead. The proportions have been changed from time to time but the following analyses are given by E. A. Droegemueller, "Better Lead Scavenging Needed for Aviation Gasoline" (A.S.T.M. Bulletin, October 1948, page 53) for two fluids that are currently used:

Weight per cent:	1-T Fluid	1.5-T Fluid
Tetraethyl lead	61	52
Ethylene dibromide	36	45
Dye, impurities, etc.	3	3
Volume per cent:		
Tetraethyl lead	65	57
Ethylene dibromide	28	37
Dye, impurities, etc.	7	6
Lead content, per cent	39	33
Bromine content, per cent	30	39
Specific gravity at 20° F.	1.746	1.867

Addition to Number of Tubes in Bundle

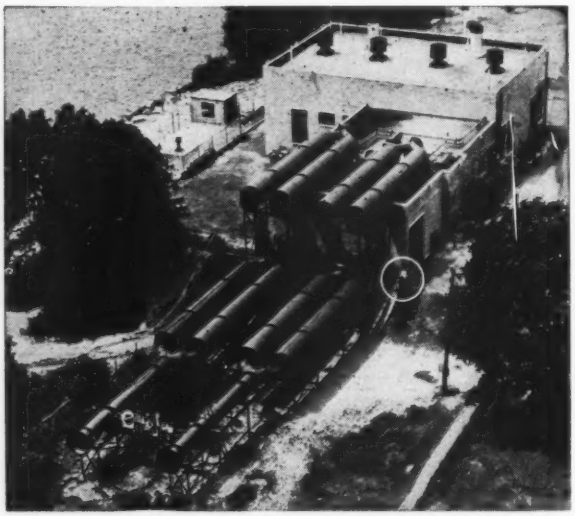
Note: The following information has been brought to our attention.

In our Questions on Technology of March 17, 1949, formulas were developed for the number of tubes in the bundle of an exchanger. Since that time we notice the article by Frank L. Rubin, "Shell and Tube Heat Exchangers," Buffalo meeting of A.I.Ch.E., September 1947, which gives the following formula:

$$\text{No. tubes} = C\,(L/P)^2$$

in which L is the outer tube limit diameter (inches), P is the tube pitch (inches), and C is a constant which has the value of 0.75 for a square pitch arrangement and 0.86 for a triangular arrangement. This formula was probably obtained by actual tube counts and it is supposed that it applies to a conventional number of passes such as the two or four-pass arrangements. The corresponding constants computed in the Questions on Technology of March 17, 1949, page 162, are similar to those of Rubin except that they are conservative.

The knowledge that solved this job is waiting to go to work for you



The big Maxim Silencers above (note size of man in circle) quiet the scream of centrifugal compressors on test stands . . . as tough a silencing job as you are likely to find. Maxim engineering solved it and can solve your silencing problems too. Take advantage of Maxim's greater experience when you have silencing to do.

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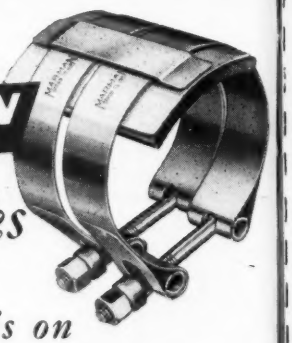

...stops leaks when the pressure is on

Marman High Pressure pipe leak clamps withstand pressures of 1,000 p.s.i. without leaking. As a permanent repair for high pressure pipe in sizes from 2" to 8" this clamp is unexcelled. Here are some of the reasons.

- Perbunan pad resistant to gas, oil, water, gasoline, etc.
- Stainless steel patch plate contoured to give maximum sealing pressure.
- Stainless steel band for high strength and corrosion resistance.
- No loose parts—integral bolts trunnions and patch plate.
- Easy positioning—patch plate movable allowing take up bolts to be positioned as desired.

For information write Dept. O-3

MARMAN PRODUCTS CO. INC.
940 W. FLORENCE AVENUE
INGLEWOOD, CALIFORNIA

Cost-imating

A WEEKLY FEATURE OF THE OIL ANG GAS JOURNAL

Brick and Tile

APPROXIMATE COSTS OF BRICK, TILE, AND BOARD, 1946*

(Mainly for furnaces, boiler settings, etc.)

	Unit	Costs			Notes	Ref.†
		Material	Labor	M. & L.		
Brick (stills or boilers):						
Common or red	$ per M	18-24	45-55	65-75	18 brick per cu. ft.‡	1, 2
Fire clay	$ per M	58-73	60-75	115-145	18 brick per cu. ft.	1, 2
Insulation	$ per M	136-158	60-75	190-220	18 brick per cu. ft.	2
Paving, 3-in.	$ per M	41-55				1, 2
Special brick (f.o.b. plant):						
Sand lime	$ per M	19.3				1
Silica	$ per M	61-63			Carload lots	1, 3
Alumina (high)	$ per M	97-420			Price increases with alumina content (50-80 per cent)	3
Magnesite (basic)	$ per M	440-490				3
Magnesite (basic)	$ per ton	90			Special shapes	3
Chrome	$ per M	320-350				3
Chrome	$ per ton	63			Special shapes	3
Cement building block	ct. each	15.6			8 x 8 x 16 in., f.o.b. plant	1
Tile (still or boiler):						
Flat roof, suspended, 10-in.	$ per sq. ft.	2.90	2.30	5.20		2
Curved arch, suspended, 9-in.	$ per sq. ft.	3.10	2.50	5.60		2
Tile (miscellaneous):						
Hollow, building	ct. each	9.5			f.o.b. Chicago	1
Floor, standard	$ per sq. ft.	0.23			f.o.b. factory	1
Wall, white, glazed	$ per sq. ft.	0.27			f.o.b. factory	1
Board:						
Asbestos cement, ¼-in. flat	$ per sq. ft.	0.26	0.10	0.36		2
Asbestos cement, ½-in. flat	$ per sq. ft.	0.50	0.17	0.67		2
Asbestos cement, ¼-in. corrugated	$ per sq. ft.	0.27	0.10	0.37		2
Black panel, 42 by 48 in., ¼-in.	$ per sq. ft.	0.95			Instrument panel	2
Black panel, 42 by 48 in., ½-in.	$ per sq. ft.	1.23-1.40	0.65-0.80	1.80-2.10	Instrument panel f.o.b. cars	1
Plaster board, buildings	$ per M sq. ft.	33.77				1
Insulation board, buildings, 48-in.	$ per M sq. ft.	18.46			f.o.f. cars	1
Mortar or cement:						
High temperature for fire clay	ct. per lb.	4.5-5.5			400-500 lb. for M fire brick	2
Insulation (brick)	ct. per lb.	5.0-6.5			About 75 lb. for M brick	2
Wall wash for seal	ct. per lb.	9	8.5	17.5	About 250 lb. for M sq. ft. wall	2
Plastic fire brick	$ per ton	58			Joints, curves, fillets, etc.	2
Insulation aggregate behind headers of stills, etc.	ct. per lb.	6			4-5 lb. per sq. ft. header	2
Asbestos rope for expansion joints	ct. per lb.	36-39	8-9	44-48	About 30 lb. per MM, B.t.u.	2
Asbestos rope for expansion joints	ct. per ft.	11.5				2

*Cost indexes were published in Cost-imating No. 20, March 3, 1949. Latest 1948 indexes for brick and tile is 127 and for cement 125. †References: (1) Wholesale Prices, 1946, Bull. 920, Bureau of Labor Statistics, U. S. Dept. of Labor. (2) Author's files for several dates, 1929, 1931, 1937, and 1948. (3) Day, "Refractories," Metal Progress, October 1936. ‡Mortar thickness is relatively large with common brick.

No. 24 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

HERE'S HOW Comco SOLVES YOUR Field Communications Problems

Comco starts from scratch...sizes up your particular operation and its unique problems...plans a communications system to meet those needs...provides all necessary equipment -- mobile and main station. In short...you give COMCO the problem...COMCO gives you a complete communications system plan -- practical, economical, designed for you!

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- **ESPECIALLY DESIGNED FOR ADJACENT CHANNEL OPERATION**...to meet future requirements.
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- The stuffing box clamp of the Norris Brothers Polished-Rod Liner is *right side up,* permitting packing from top. *Two* set screws provide for extra safety.

- **Liner tube is tapered at top end (not flared) and is reinforced with an internal ring or sleeve which fits into and reinforces the liner.**
- **Packing is all placed above taper end of liner—the proper position for best results.**
- **Both stuffing box and stuffing box clamp come packed with the very finest of packing.**

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is the tool you need for dumping any amount of cement, sand, gravel, acid, or chemical, etc., in a continuous operation without interruption. The full open throat eliminates the hazard of stringing a load through the fluid column. There are no valves, sleeves, or ports to become fouled or clogged—no danger of accidental or premature unloading due to line whip or faulty brakes.

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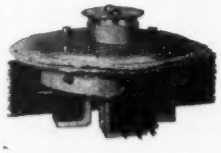

...for use in combination with the CEMENT DUMP BOTTOM, is ideal for use in starting an off-bottom bridge or plug. Made of drillable material, can be used for temporary or permanent installations.

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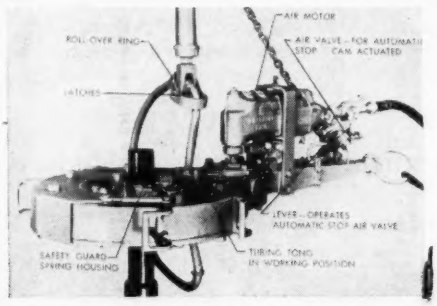
OIL AND GAS EQUIPMENT Digest

IT'S NEW ✓ CHECK IT

by Dan B. Miller

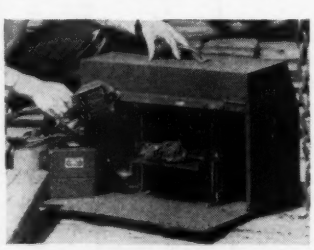
(1) AUTOMATIC POWER TUBING TONG. The Model 3500 tubing tong is engineered with automatic gripping and releasing jaws and is self-aligning for instant operation on and off the pipe. Jaw system is entirely automatic in its engagement and disengagement of the pipe,



it being necessary only to swing the tong onto the tubing and open the throttle. This automatically grips the pipe and upon completion of the operation, by placing the air motor in reverse, automatically disengages the tong from the pipe, eliminating necessity of the operator or helper having to unlatch the jaws. The tong is suspended in the derrick, or from a mast or gin pole, by a wire line. Swinging the open tong against the tubing closes the safety guard. When the tubing is being unscrewed, a low gear is provided to break tight joints, eliminating the necessity of hammering couplings or the use of "snipes." *Hillman-Kelley, Inc.*

IT'S NEW ✓ CHECK IT

(2) MINERALIGHT INSPECTION CABINET is a light, tight metal box, provided with a viewing aperture, doors for the introduction and manipulation of various specimens within the box, arm holes for use of the hands within the box, a compartment for holding a Mineralight ultraviolet lamp, and an electrical circuit for operation of the lamp. Unit can be used for on-the-spot work in the laboratory, plant, or field. Mineralight used directly at the well on cores immediately after they have been taken from the core barrel, gives a rapid and accurate analysis. *Ultra-Violet Products, Inc.*

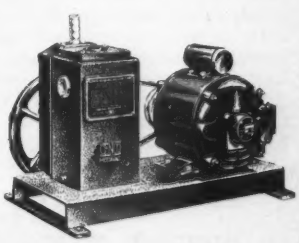


IT'S NEW ✓ CHECK IT

(3) FIGURE 1030 FOG FIRE-FIGHTING UNIT. The unit connects directly to a water line. A swing joint mounting makes it possible for the fixture to turn in alignment with direction of the hose pull. A 50-ft. length of ¾-in., high-pressure hose is racked in figure 8 position for fast removal without kinking. The nozzle supplies finely atomized water with medium pressures as normally provided by city water systems. Laboratory tests report a 20-ft. fog projection at 50 lb. nozzle pressure with a gallonage discharge of 15.9 per minute. At 75-lb. nozzle pressure, the projection is increased to 25 ft. with a gallonage discharge of 19.3 per minute. Water fog has the ability to dilute vapors, washing the air so that it reduces the hazard of an operator being overcome by gas or smoke. *Bowser, Inc.*

IT'S NEW ✓ CHECK IT

(4) MEGAVAC VACUUM PUMP. A pump suitable for high vacuum exhaustion of the larger laboratory applications, either direct or in connection with diffusion pumps, and for the smaller industrial applications. Features are a positive sealing ring which prevents oil leakage around the shaft, an improved leakproof cover, and positive lever-action vane stops which prevent expulsion of the pump vanes upon sudden starts with the pump mechanism filled with oil. An oil outlet is provided in the side of the case and a sight



The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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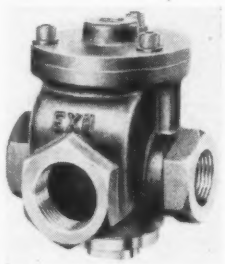
gage permits easy reading of oil level. The ½-hp. motor operates at 600 r.p.m., providing a free air capacity of 57 liters per minute. Merit factor, 40 per cent. *Central Scientific Co.*

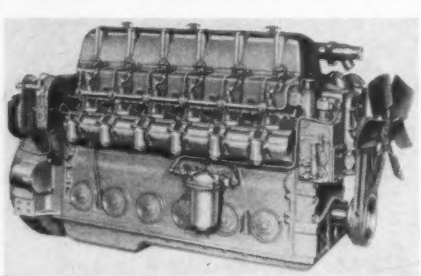
IT'S NEW CHECK IT

(5) SAFE AIR-CONTROL VALVE. Safe control of air power used in mines, chemical plants and other locations exposed to fire hazard, is assured by this new valve. It is generally actuated by a pilot valve which can be hand, foot, or cam operated, eliminating the necessity for safeguarding against electrical hazards. This feature makes the valve especially suited for duty in oil wells and similar installations where sparks would create a fire hazard or where electricity is prohibited. It is available in straightway and three-way models both of which are remotely controlled and can, of course, be set up in series. *Ross Operating Valve Co.*



IT'S NEW CHECK IT

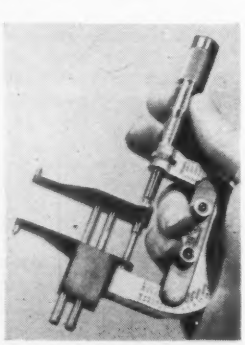
(6) P&H DIESEL POWER UNIT. The engine, operating on the two-cycle principle, combines the advantages of medium and high crankshaft speeds, satisfactory piston speeds, and an over-all lighter-weight unit. All engine parts are interchangeable from one model to another



with the exception of such parts as the crankshaft, camshaft, and crankcase. Each cylinder is an independent, fully water-jacketed assembled unit which provides a saving in time when maintenance is required, thus reducing the cost of major overhauls. All P&H diesel engines having bore of 4.5 in. and stroke of 5.5 in. and displacement of 87.5 cu. in. per cylinder. Model 387-C crankshaft has four main bearings and model 687-C crankshaft has seven main bearings. *Harnischfeger Corp.*

IT'S NEW CHECK IT

(7) IMPROVED MICRODAPTER—the low-cost attachment for outside micrometers that permits taking precision internal measurements. Operation is easy even in locations ordinarily inconvenient or inaccessible to conventional inside micrometer sets. Since the measuring points are cone shaped and project beyond each leg, they readily reach into internal grooves, into recesses, behind shoulders, and in deep bores. The attachment clamps instantly and securely to any micrometer frame and measurements are read directly on the regular thimble with original micrometer accuracy. *Rimat Machine Tool Co.*

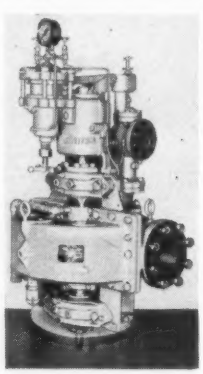


IT'S NEW CHECK IT

(8) CRALL SPIRAL PARAFFIN SCRAPERS fit any sucker rod. When scrapers are placed on the reciprocating rod at specified distances, they meet or pass each other with each reciprocation. The complete coverage and churning action in the tubing column of oil prevents the accumulation of paraffin. Scrapers average 6 oz. each, making extra load to string negligible. Scrapers alternate—one right, the next left, eliminating tendency of the rod to unscrew. Crall spiral scrapers are made of ⅛-in.-thick mild steel, approximately 6 in. long. The width of the scraper blade varies to give 1¾-in. o.d. coverage in 2-in. tubing, and 2¼-in. o.d. coverage in 2½-in. tubing, regardless of size of sucker rod used. Scraper will not slip on the sucker rod. *Petroleum Specialty Co.*

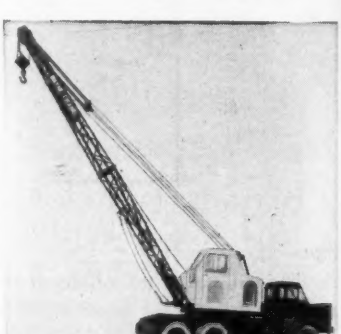
IT'S NEW CHECK IT

(9) VERTICAL TURBINE developed to drive centrifugal pumps and other vertical units. Small and compact, this rugged vertical steam turbine is capable of developing ratings up to 90 b.hp. This turbine is available in either semisteel or cast steel to meet the requirements of practically any steam pressures and temperatures. The standard machine can take thrust loads in either direction up to approximately 1,500 lb. and can be changed to take even higher thrust loads. It is equipped with both constant-speed and emergency governors. Pump governors can be built into the machine. Equipment also includes a bolting flange at the lower part of the casing to permit bolting to the flange of the driven unit. *Whiton Machine Co.*



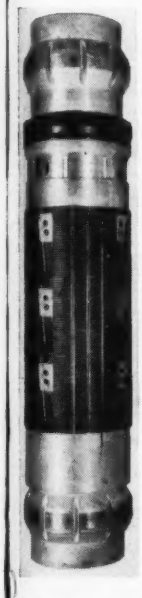
IT'S NEW CHECK IT

(10) MODEL 44 CORSAIR TRUCK-MOUNTED CRANE. A new ½-yard, 10-ton truck-mounted crane and excavator travels at truck speeds, swings at 5½ r.p.m. and is convertible to all crane and shovel attachments. The six-wheel, tandem-type carrier, built especially for crane mounting, is of 16-in. 45 lb., steel I-beam construction. Outrigger tubes are integral with frame—one pair ahead of front wheels and one pair behind rear wheels—to provide maximum rigidity and stability. Improved boom clearance and visibility are achieved by an offset, one-man cab and tapered frame



ends. Other carrier features include 8 or 10-tire traction and differential lock for heavy, off-the-road work. Safety features include a full-vision cab, boom snubbers and a spring-loaded boom check brake. *Wayne Crane Division of American Steel Dredge Co.*

IT'S NEW CHECK IT



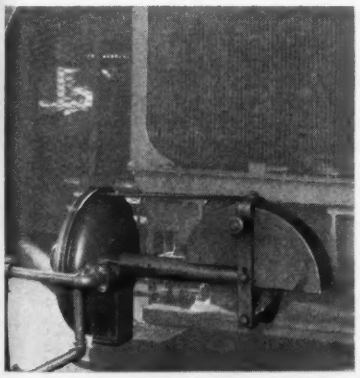
(11) O-C-T DOWN-THE-HOLE HANGER provides means of putting casing weight down the hole and relieving critical loads on the long, slender unsupported outer casing string on offshore and other water locations. Weight is put on the outer string at a point where solid formation supports it, thus eliminating the column load which causes columns of high slenderness ratio to buckle and bend under load. The O-C-T "DH-1" casing hanger also eliminates the chances of dropping the inner strings in case of surface accidents to completed wells. To set, simply install in inner string at point to be suspended, run it in and cement. After cement has set, adjust tension on the inner string, close blowout preventer rams, and pump between the strings. *Oil Center Tool Co.*

IT'S NEW CHECK IT

(12) LAWRENCE HYDRAULIC PULLING TOOL. It is used for pulling screen and liners, production packers, drill pipe, or tubing. Anchoring in casing and pulling directly on the fish, unless fish is in open hole, this tool operates entirely on pump pressure developing a 47 to 1 pressure ratio. It retains top efficiency of operation regardless of depth of well. Runs in 5-in. through 9⅝-in. casing and available on rental basis. *Dailey Oil Tools, Inc.*

IT'S NEW CHECK IT

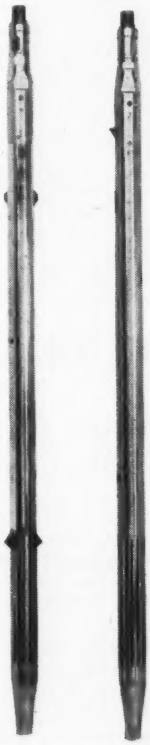
(13) PNEUMATIC STARTER, designed for use on combustion engines, is operated by gas or air pressure. Starter is mounted to operate by connecting with the engine crankshaft through a ratchet connection, so that it acts much the same as a conventional crank. Starter drive shaft is equipped with small spur gear which meshes with a gear segment or teeth in starter rod, depending on size and type of starter. Quick-opening valve admits pressure to diaphragm case, moving linkage assembly which spins motor. Comparatively low pressures are required to operate starters. Available in 13, 16, and 20-in. diaphragms. Larger models are adaptable for vertical mounting. All models can be mounted horizontally. *King Tool Co.*



IT'S NEW CHECK IT

(14) RCD CONCRETE DRILL BIT makes hundreds of holes without dulling. These bits range in sizes from ¼ to 2 in. Bits are handmade from high-grade steel with heat-treated special carbide cutters set in and brazed to the blunt end of the bit shaft. The blunt-end design enables the bit to drill through gravel or rounded rocks in concrete rather than deflecting around them. Design also reduces breakage to a minimum. *Rotary Concrete Drill Co.*

IT'S NEW CHECK IT



(15) TUBULAR CALIPER SURVEYS accurately measure and record the extent of corrosive pitting in tubular goods while in place in the well. Instrument has 15 caliper points for contact and any one contact point will independently record any irregularity. Close spacing of contact points, $\frac{7}{16}$ in. for 2⅜-in. o.d. tubing, $\frac{9}{16}$ in. for 2⅞-in. o.d. tubing, assures maximum coverage of corroded areas. Employing a standard lubricator and surface control equipment, caliper may be safely run under pressure by means of a steel measuring line. Caliper surveys 9,500 ft. of pipe in a single run. It is unnecessary to kill the well. Clear direct-reading record is obtained from the caliper and interpreted by company technicians. *Tubular Service & Engineering Co.*

IT'S NEW CHECK IT

(16) ATTAPULGUS AAA GRADE CLAY for percolation, displays 10 per cent to 20 per cent more refining efficiency and maintains this increase over its life. It thereby becomes practical to reuse it through more cycles. Higher yields per ton occur in such factors as filter turnovers, clay burned, oil and naphtha losses, steaming costs, and upkeep on burner equipment. *Attapulgus Clay Co.*

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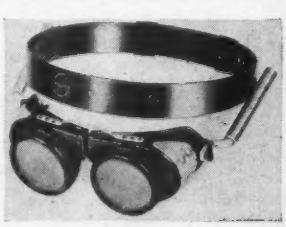
((17) IMPROVED HEADREST GOGGLE is light and comfortable to wear, simply adjusted, practical, and easy to raise and lower. Lenses, standard 50-mm. size, are available in shades 3 through 6. They are held in individual eye cups. Cover glasses protect the filter lenses from pitting. Eye cups are of molded plastic, joined together flexibly, so they may be easily fitted. The outside eye cup has ventilating



screen and baffle plate, which pervents fogging, yet excludes flying particles and stray light rays. Goggle assembly is hinged from the sides of the headrest by telescopic arms. Concealed springs hold goggles gently against the face. *General Scientific Equipment Co.*

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TRADE LITERATURE

(18) RESERVOIR - ENGINEERING APPARATUS. The folder presents a wide range of reservoir-engineering instruments for field and laboratory use, and gives exact capacities of each. *Coleman Instrument & Manufacturing Co.*

(19) HYDRO-SCAVENGER. A four-page folder describes truck-mounted vacuum equipment for cleaning sump pits, acid separators, storage-tank bottoms, heat exchangers, and fractionating trays in distillation towers. *Whittington Pump & Engineering Corp.*

(20) DIESEL'S THE POWER. This 16-page, fully illustrated booklet shows the 16 models of engines and generators manufactured, together with specifications and application for each. *R. H. Sheppard Co., Inc.*

(21) PIPE-CUTTING AND BEVELING MACHINE. The four-page folder describes equipment for cutting and beveling big-inch pipe, lists all parts, and includes price list on parts for all sizes of machine. *M. J. Crose Manufacturing Co., Inc.*

(22) CHEMICAL WEED CONTROL, a 34-page booklet describing the action capabilities of this chemical agent in destroying weeds without harming the grass. The company also produces a chemical that kills all vegetation in areas where no inflammable material is wanted. *C. B. Dolge Co.*

(23) LINDBERG FISHER BLOWERS, a four-page folder giving complete specifications and data material on each type of blower manufactured. *Lindberg Engineering Co.*

(24) SERIES 300 PANALARMS explains in detail the various types and specifications of Panalarms, an industrial signal with a broad range of use where sound and visual alarms are required to indicate failure or changes off normal. *Panalarm Products, Inc.*

(25) OFFSHORE EQUIPMENT. New 56-page plastic-bound brochure describes and illustrates a complete line of marine construction, repairs, and fabrication of equipment for offshore drilling. Included in pictorial description are cargo barges, oil barges, liquid-sulfur tank barges, canal and river tugs, sea-going tugs, passenger and service launches, trawlers, clippers, power barges, dredges, pontoons, pipe jackets, and quarters for offshore drilling. *Avondale Marine Ways, Inc.*

IT'S NEW ✓ CHECK IT

(26) SINGLE-STAGE AND TWO-STAGE COMPRESSORS. The two-page illustrated bulletin gives detailed specifications, over-all dimensions, and shipping weight of compressors designed for operation on diesel oil, natural gas or butane. *White-Roth Machine Corp.*

(27) SD AND SDO MULTIPLEX PUMPS. Centrifugal, multistage, split-case, volute type, designed for medium and high-pressure service are described in a 16-page illustrated booklet. *Byron Jackson Co.*

(28) GRID TRAYS for handling filtering material have been described in a n illetin. It explains the applications of grid trays handling chemicals and other materials in fractionati columns and towers, and "cat" baskets in petroleum refineries. *Kerlow Steel Flooring Co.*

(29) NEW RESN-X, technical data sheet which lists in detail the various acids to which this flooring has excellent resistance. *Rock-Tred Corp.*

(30) COUNTERFLO, a new 12-page bulletin describing forced air space heaters. The unit is described as being especially suitable and economical for heating large structures without ductwork and also may be employed as a central heating plant. *Dravo Corp.*

(31) STANDARD-PLUS. This 12-page brochure describes in detail, examples of complete process units, complete process plants, and special process equipment. *Industrial Process Engineers.*

(32) BLAST FURNACE GAS BURNER. A two-color bulletin on complete line of blast-furnace gas burners. Bulletin includes not only blast-furnace installation pictures but cross-section drawings of various other types of burners for waste and primary fuels. *Peabody Engineering Corp.*

(33) EXPANDED METAL ENGINEERING DATA. New eight-page bulletin gives engineering data including load deflection, air-flow comparison, and free openings of both standard and flattened mesh types of expanded steel. *Joseph T. Ryerson & Son, Inc.*

(34) DATA TABLE ON WORKING PRESSURES. Maximum allowable working pressures for water-tube and fire-tube boilers, assembled in a useful table which will serve as a handy reference. *Babcock & Wilcox Tube Co.*

(35) METALLIC RECTIFIERS. A new eight-page, two-color booklet contains information of value to refinery, pipe-line, and central-station operators. The booklet contains complete descriptive information, line diagrams, installation and equipment photographs, and specification data and ratings. *Westinghouse Electric Corp.*

(36) CORROSION CONTROL FOR UNDERGROUND PIPE. New 28-page manual describes methods employed to protect underground pipe lines from corrosion. Test data on the properties and performance of Fiberglas pipe wrap are included. The manual is illustrated with charts and photographs. *Owens-Corning Fiberglas Corp.*

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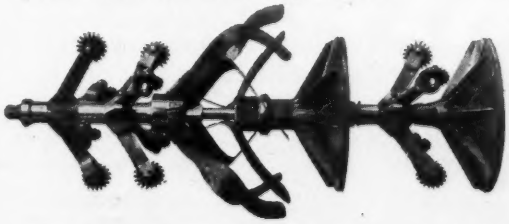

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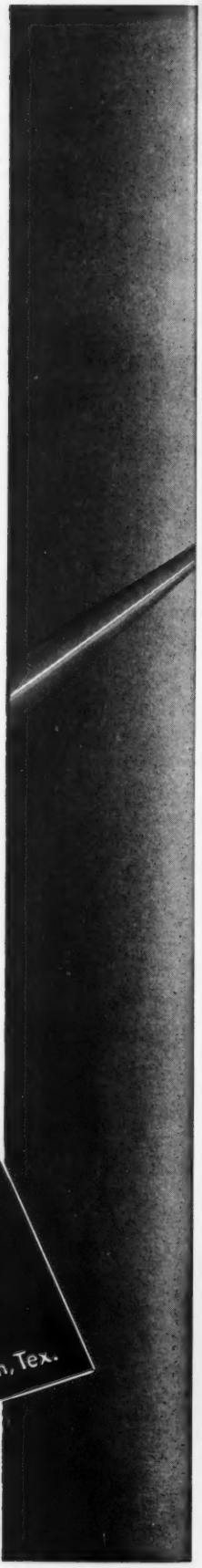

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PIPE LINES

El Paso Natural Would Lay San Juan Project

El Paso Natural Gas Co., in what it described as a move to meet an anticipated shortage of natural gas in the San Francisco Bay area in 1951, has asked Federal Power Commission for authorization to construct a 451-mile pipe line extending from northwestern New Mexico to a point near the Arizona-California border. This line originally was proposed by San Juan Pipe Line Co., an affiliate of El Paso. El Paso, however, now proposes to construct the facilities as a part of its own system.

The line would initially deliver 150,000,000 cu. ft. of gas daily from fields in the San Juan basin to the Arizona connection with El Paso's system. From there, the company said, gas would be transported to the vicinity of Needles, Calif., where it would be sold to Pacific Gas & Electric Co., which distributes gas in the Bay area of California.

Proposed project would cost an estimated $28,000,000, and would consist of the 451-mile, 24-in. line, approximately 101 miles of feeder line, two compressor stations with total horsepower of 6,300, a natural-gasoline extraction plant, and a gas-dehydration plant.

The company, headquartered in El Paso, Tex., proposes to finance the project through sale of $18,500,000 in 3¼ per cent bonds, a $5,000,000 bank loan, and $4,500,000 from company funds.

FPC in February authorized El Paso to construct new pipe-line facilities for delivery of 250,000,000 cu. ft. of gas per day to Pacific Gas & Electric for ultimate sale in central and northern California.

Shell Amplifies Line Acquired From RFC

Shell Oil Co., Inc., on March 11 placed in operation a new products pipe line from its Wilmington refinery to the Los Angeles division marketing depot near Washington and Alameda streets. The new 17½-mile, 4-in. line will handle two grades of gasoline.

Major portion of the new line has been leased from the Reconstruction Finance Corp. This line, constructed in 1944, has been idle since operation of the Torrance synthetic rubber plant was suspended. It was necessary for Shell to lay 2½ miles of new pipe in

Gleason Romans, left, manager, Airplane Pipe Line Patrol Co., and F. C. Whiteside, right, assistant chief engineer, Interstate Oil Pipe Line Co., entering a Hellercopter type of helicopter during recent flights over pipe-line routes in the vicinity of Tulsa to demonstrate the possibilities of such craft for certain types of pipe-line patrol; for the transportation of maintenance men; and for reconnaissance of proposed pipe-line routes

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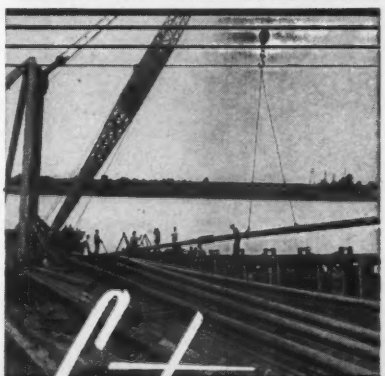

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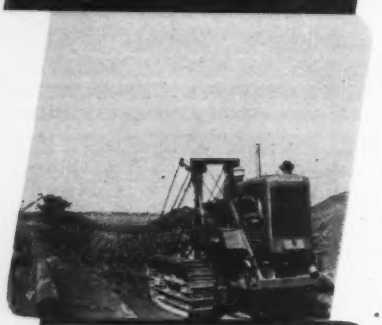

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order to connect the RFC line with its facilities. Centrifugal pumps are being installed at the Wilmington refinery; when completed, the project will include metering system with strainers and calibration tanks at both the refinery and the marketing terminal.

The new line will eliminate many miles of trucking by Shell's "Clipper Fleet" through the highly congested traffic area between Wilmington and the center of Los Angeles.

Oral Arguments April 4 on East Tennessee Proposal

Federal Power Commission has ordered intermediate decision procedure omitted, and has scheduled oral argument for April 4 in Washington, D. C., in the proceeding involving application of East Tennessee Natural Gas Co.'s proposal for FPC authorization to construct natural-gas facilities which would be used to transport 60,000,000 cu. ft. of gas daily to the Atomic Energy Commission's Oak Ridge, Tenn., plant.

The company, in a move to speed final determination in the proceeding, had requested FPC action, and no objection to granting of the motion was filed. East Tennessee said the commission's authorization is necessary, before delivery of steel pipe, allocated through a voluntary plan under the Department of Commerce, can be accepted. Steel producers participating under this plan have indicated that deliveries will commence about the end of March, the company added.

East Tennessee, in asking an early decision in the proceeding, also pointed out that the Atomic Energy Commission has certified the proposed service to be "necessary in the interest of the common defense and security. . . ."

The company, with headquarters in Chattanooga, Tenn., is proposing to build approximately 170 miles of 22-in. line extending easterly from a connection with Tennessee Gas Transmission Co. in northwestern Tennessee, to Oak Ridge.

Traffic Up 9.8 Per Cent in 1948, Pipe-Line Firms Show

Traffic of large petroleum pipe-line companies in 1948 exceeded the preceding year by 9.8 per cent, Interstate Commerce Commission figures recently released, indicate. Statement was compiled from reports of 45 companies having annual operating revenues of more than $500,000.

Revenue of these carriers was up 13.6 per cent in the year, ICC reported.

Traffic amounted to 2,556,067,010 bbl. in 1948, against 2,317,256,483 bbl. in 1947. Revenue totaled $340,850,100 compared with $300,092,514 in the preceding year.

Humble Pipe Line Co. reported largest traffic volume and revenue of the 45 reporting pipe-line companies. Traffic was 299,928,558 bbl. and revenue amounted to $37,101,438. Traffic volume was up 7.8 per cent and volume up 10.8 per cent.

Stanolind Pipe Line Co. reported revenue of $35,271,028 on 146,812,568 bbl. Revenue was up 21.4 per cent while volume increased 10.4 per cent.

Largest volume increase on a percentage basis was recorded by Eureka Pipe Line Co., whose 7,799,605 bbl. in 1948 exceeded 1947 volume by 61.6 per cent.

Arkansas Pipeline Corp. had the greatest percentage increase in revenue, according to ICC. The company's 1948 revenue was $1,045,428, 47.5 per cent above 1947 figures. Volume of the company was up 14.9 per cent.

Buffalo Pipe Line Corp. showed the second greatest increase, both in traffic and revenue. Traffic of 7,171,725 bbl. was up 33.1 per cent, while revenue of $971,291 was up 39 per cent from 1947.

Project Five Pipe Line Corp. ranked third in both revenue and traffic volume, with revenue 32.4 per cent over 1947, and volume up 28.9 per cent over a year earlier.

ICC reported that of the 45 companies reporting to the commission, 41 indicated volume increases, 3 showed decreases and 1 company did

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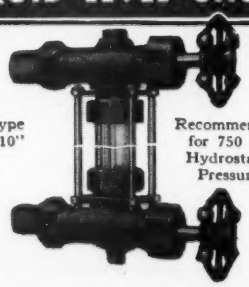

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not report for 1947. In revenue, 43 were up in the year, 1 declined, and 1 did not report for the preceding year.

Preparations for 1949 Construction

Contracts have been let in recent weeks for major projects totaling 1,883 miles of which 390 miles is for crude-oil systems and 1,493 for natural gas. The principal projects under way at this time total 1,734 miles of which 1,279 miles are for crude oil and 455 miles for natural gas. Large natural-gas projects for which contracts are to be let soon total 1,621 miles. These projects altogether totaling 5,238 miles are listed below with the names of contractors for those projects already contracted.

Major Projects for Which Contracts Recently Have Been Let

Crude Oil:

Buckeye Pipe Line Co., 82 miles, 22-in., Lima-Toledo, Ohio, Anderson Brothers Corp.

Interstate Oil Pipe Line Co., 70 miles, 12-in., Elk Basin., Wyo., to Laurel and Billings, Mont., Edmonds Construction Co.

Texas Empire Pipe Line Co., 183 miles, 18-in., Patoka-Wilmington, Ill., Anderson Brothers Corp., and H. C. Price Co.

Texas Pipe Line Co., 55 miles, 22-in., Wood River-Patoka, Ill., Sheehan Pipe Line Construction Co.

Natural Gas:

Atlantic Seaboard Corp. and Virginia Gas Transmission Corp. (Columbia Gas System), 268 miles, 26-in., Clendenin, W. Va.-Rockville, Ind., H. C. Price Co. and Ray L. Smith and Son, Inc.

Cities Service Gas Co., 130 miles, 26-in., Newton-Ottawa, Kans., R. H. Fulton & Co.

El Paso Natural Gas Co., 450 miles, 30-in., looping from Eunice, N. M., to Blythe, Calif., work to be done by company spreads.

Northern Natural Gas Co., 135 miles of 20-in., and 24-in. looping in Kansas, Nebraska, Iowa, and Minnesota, G. G. Griffis Construction Co. and Eastern Construction Co.

Pacific Gas & Electric Co., 510 miles, 30 or 34-in., Topock, Ariz.-Milpitas, Calif., Bechtel-Price-Conyes.

Principal Projects Under Way

Crude Oil:

Atlantic Pipe Line Co., 382 miles, 10-in. Refugio-Crane, Tex., A. C. Holder Construction Co.

Phillips Pipe Line Co., 289 miles, 12-in., Odessa-Borger, Tex., Morrison Brothers Construction Corp.

Shell Pipe Line Corp. (Ozark System), 435 miles, 22-in., Cushing, Okla.-Wood River, Ill., Midwestern Constructors, Inc., Smith Contracting Co., Anderson Brothers Construction Corp.

Texas Pipe Line Co. (Basin System), 173 miles, 24-in., Wichita Falls, Tex.-Cushing, Okla., Smith Contracting Co.

Natural Gas:

Michigan-Wisconsin Pipe Line Co., 455 miles, 24-in., Hansford County, Texas-Marysville, Mo., J. R. Horrigan Construction Co.

Large Projects for Which Announcements Regarding Letting of Contracts Are Expected Soon

Natural Gas:

Mississippi River Fuel Corp., 221 miles of loops between Monroe, La., and St. Louis.

Tennessee Gas Transmission Co., 200 miles of looping.

Texas Gas Transmission Corp., 600 miles, 26-in., Memphis-Middletown, Ohio.

Transcontinental Gas Pipe Line Corp., Mercedes, Tex.-New York City, for which an announcement of contracts for 600 miles is expected soon.

Kansas-Nebraska Proposal

Kansas-Nebraska Natural Gas Co., Inc., Phillips, Kans., has asked Federal Power Commission to authorize building of additional natural-gas facilities, increasing total capacity of its system to 140,000,000 cu. ft. daily, at an estimated cost of $2,562,508.

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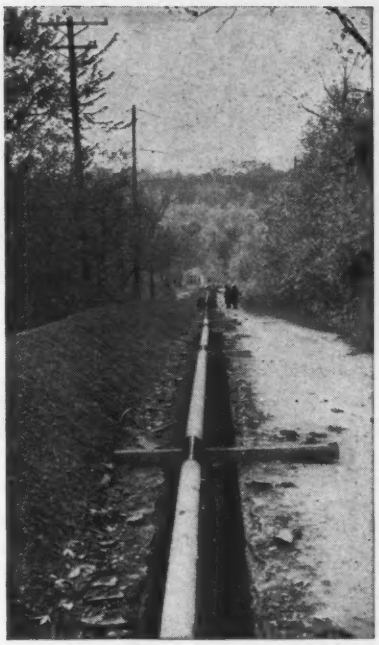

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The manuals listed below are booklets of articles which have previously appeared in The Oil and Gas Journal and which have been bound in this form for use by our subscribers who may not have received the issues in which the information originally appeared.

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Reference Manual on Electric Logging **1.00**
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WALL MAPS

These authentic wall maps, drawn and published especially for readers of THE OIL AND GAS JOURNAL, are available at the following individual prices, or if desired, all four may be had at the single price of $4.00. Size of each map—36″ x 48″. Printed in four colors.

1948—CRUDE OIL AND PRODUCTS PIPE LINE WALL CHART—All crude and products pipe lines in U. S. with owner names. Detailed insets of Houston and Tulsa areas. Locations of major refineries plus listing with capacities. Printed in four attractive colors. Copyright Sept. 1948. **Price $2.00 ea.**

NATURAL GAS PIPE LINES OF THE U. S.—Describes 48 major and 66 smaller gas pipe line systems in U. S. Handsome, four-color offset suitable for framing. Size is 36″ x 48″. Copyright Sept. 1947. **Price $1.50 ea.**

JOURNAL GUIDE TO INTERNATIONAL OIL—Printed in four colors; shows principal producing areas, pipe line and tanker routes. World map 36 x 48 in. Copyright Dec. 1948. **Price $1.50 ea.**

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A reprint of a series of articles on 18 Petroleum Engineering schools, which appeared in The Oil and Gas Journal from Sept. 6, 1947, to April 8, 1948.

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REFINING

Skelly Oil Co. Enlarging Refinery at Eldorado

Skelly Oil Co. is enlarging and modernizing its refinery at Eldorado, Kans., at an estimated cost of between $8,000,000 and $10,000,000.

A new catalytic-cracking unit is being built, as well as a new crude unit. Capacity of the plant will be increased from 25,000 to 35,000 bbl. daily.

Erection of the catalytic unit began several months ago, and completion is scheduled in November. Work on the crude unit is to begin later this year, with completion scheduled for 1950.

British Regain Control of Haifa, Palestine, Refinery

Control of Consolidated Oil Refineries, Ltd., has been resumed by British management at Haifa, Palestine. An Israeli caretaker has been in charge since British evacuation of Palestine last year.

It has been learned the refinery plant and machinery is scheduled to be overhauled and repaired as quickly as possible, so that production may be resumed within approximately 6 weeks.

Refinery operations had been shut down since the evacuation.

Output of Refinery Bought By Italy to Be Stepped Up

Capacity of the old Danciger Oil & Refining Co.'s refinery near Longview, Tex., which was sold recently to Italy by W. C. Berry and associates, Tulsa, will be increased from 7,500 bbl. daily to 10,000 bbl. daily, and modification will be carried out during dismantling by Delta Engineering Corp., Houston, which was recently awarded contract by Raffinerie Siciliane Olii Minerali, S.A., of Milan, Italy (RASIOM), new owners of the refinery.

Engineering work is being performed in conjunction with Universal Oil Products Co. to increase capacity of the refinery, which will process Arabian Abqaiq crude, when it is reassembled at Augusta, Sicily.

Dismantling operations are now under way and are being supervised by Dr. P. C. Bazzocchi and Carlos Galetti, members of the Italian engineering firm S.T.I.I.

Material and equipment of the refinery will be prepared for shipment at the job site and transported either by rail or truck to an undetermined port for export. Work will be completed within 90 days.

Berry only recently announced sale of the plant *(The Oil and Gas Journal, March 24, page 311)* to Italy. It produced aviation gasoline during the war, but was regarded as uneconomical to operate in the United States under present conditions. It has not been in operation since the war.

Regenerator Piece, Largest Made in Chicago, Shipped

Largest piece of equipment ever to be moved from a plant in the Chicago area, a section of a fluid catalytic cracking unit, has been shipped by Graver Tank & Manufacturing Co., Inc., from its East Chicago, Ind., plant for installation at Wood River Oil & Refining Co.'s Wood River, Ill., plant. Section shipped was the bottom cone of a regenerator which measures 19 ft. 8 in. inside diameter, and extends 20 ft. 7 in. above rails.

The completed unit, consisting of a regenerator, reactor, and stripper, when in place will have dimensions of 19 ft. 8 in. inside diameter at the bottom and extend to a height of 150 ft. above grade. In order to transport the huge bottom cone, it was necessary to load the section on a special "well-bottom" car. Unit was designed by Universal Oil Products Co., Chicago.

Ashland Puts Ohio River Terminal Into Operation

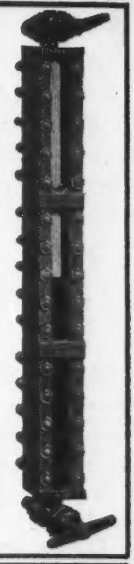
Ashland Oil & Refining Co.'s new terminal at Evansville, Ind., on the Ohio River, is nearly completed, and is now in operation, handling both crude oil and finished petroleum products.

Storage capacity is 80,000 bbl. in five tanks, and the terminal is receiving several thousand barrels of crude oil daily from the fields around Evansville for reshipment by barge to the company's Catlettsburg, Ky., refinery. Finished products for distribution in the Evansville area are also arriving in large quantities.

Tank-car and truck-loading racks have been constructed for distribution of finished products in the Evansville area, and a total of nine trucks are being used.

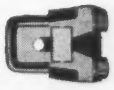
The company is also constructing

PENBERTHY
"REFLEX"
DROP FORGED STEEL
LIQUID LEVEL GAGES



Liquid always shows black—empty space shows white. Preferred where the liquid level must be easily and positively visible, and when liquids are under high pressure or at high temperature. Made of alloy temperature resisting steel and are highest quality throughout. Liquid chamber made from solid block of steel to assure perfect alignment and rigidity. Conform with A.P.I.—A.S.M.E. requirements.

The "Reflex" is one of the complete line of Penberthy Gages that meet every liquid level gage requirement.



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a new terminal at Clarksville, Ind., across the river from Louisville, Ky., and has other terminals at Covington, Ky., opposite Cincinnati; at Catlettsburg, Ky.; Kenova, W. Va.; and Floreffe, Pa.

Diesel Runs on Mixture Of Pulverized Coal, Oil

A high-speed diesel engine is being tested with fuel which is a mixture of pulverized coal mixed nearly half-and-half with its fuel oil, at the diesel school at North Carolina State College, Raleigh.

Prof. Robert B. Rice, who developed the coal-eating engine, said that 4 to 10 more years of work will probably be necessary before the idea can be brought into wide commercial use. He believes, however, that eventually the process of burning coal in the nation's thousands of diesels will be of great importance, due to the fact that "in time of war, coal is more plentiful than oil, and with coal, 1 gal. of fuel oil does the work of 2 gal."

Railroads could use it to cut down on oil consumption, Rice said. He intimated that the diesel might be important to the Navy, which uses diesels in many of its ships.

Experiments started at North Carolina State College 2½ years ago.

Shell Chemical Corp. Will Market Agricultural Goods

HOUSTON. — Through its agricultural-products department Shell Chemical Corp. has taken on the marketing of agricultural products formerly sold by Shell Oil Co., Inc., it was announced by L. V. Steck, marketing vice president of Shell Chemical.

The newly consolidated agricultural products department, which is the result of the merging of similar activities of two corporations into a single agency, will be headed by F. W. Hatch. He formerly directed insecticide and herbicide sales as manager of Shell Oil's special-products department at San Francisco.

The Shell agricultural laboratory at Modesto, Calif., will continue to develop chemicals to increase crop yields. The laboratory, a $500,000, 142-acre experimental farm set up 3 years ago, has become one of the important research stations in the country.

Progress Made in Getting Cheap Gas, Oil From Coal

Definite progress is being made by government engineers toward producing cheap gasoline and oil from coal, Dr. Henry H. Storch, head of the U. S. Bureau of Mines research plant at Bruceton, Pa., reported at Pittsburgh, while discussing experiments at the plant.

A combination of several procedures now being developed at the plant's laboratories and pilot plants may result in much cheaper processes for changing coal to liquid fuels, he said. Experiments are aimed at finding the most efficient process for combining hydrogen with the carbon in coal to produce synthetic oil and gasoline.

A basically new approach to the problem of synthetic liquid-fuel production by direct hydrogenation of coal is under investigation, Storch said. The new methods are a departure from the conventional Bergius process utilized extensively by the Germans. In this method, coal dust is mixed with oil to form a paste, which then is treated with hot hydrogen under pressure of more than 2,000 psi.

Storch's staff is seeking better results by using moderate pressure and relatively high temperatures. It results in a substantial amount of the coal being turned into coke which can be recovered and burned to produce heat for the process.

"Cost of compressed hydrogen constitutes about 50 per cent of the cost of liquid fuels prepared by hydrogenation of coal," Storch said "and another large fraction of cost comprises capital charges on investment and maintenance of equipment. Our program of process development is centered about reduction of these two large items."

Sinclair's Marcus Hook Refinery Receives Award

Sinclair Refining Co. has received a certificate award of safety from American Petroleum Industry in recognition of 1,481,040 hours worked at its Marcus Hook refinery without a disabling injury.

The time completed without a disabling accident was from March 24 to November 21, 1948.

Micro-Chemical Analysis Fellowship is Established

The Texas Co. has established a graduate fellowship in micro-chemical analysis at New York University, Dr. Wayne E. Kuhn, manager, Technical and Research division, announced. This is believed to be the only fellowship of its kind in existence.

Purpose of the fellowship is the comparative study of methods for determining presence of sulfur in organic materials by micro-chemical techniques.

Dr. John E. Vance, head of the chemistry department, will direct the work.

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General Electric's recently improved Thyrite Service Protector offers a reliable, inexpensive method of protecting low-voltage equipment from lightning. Install indoors or out, for protection of meters, motors, control equipment, or other apparatus connected to exposed circuits up to 650 volts. The Thyrite valve element allows free discharge of lightning currents to ground, with but negligible power follow-current for less than a half-cycle.

The Thyrite Service Protector is already widely used in oil fields and on power service entrances in industries—preventing costly damage to equipment. Available for single, double, or three-pole service. For full information including prices ask the nearest G-E Apparatus Office for Bulletin GEA-2977 or write *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

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AR....	ARUBA	14:55	07:10
AR....	CURACAO	16:20	08:35
AR....	MARACAIBO	16:40	08:45
AR....	CARACAS	16:45	09:10
AR....	BARCELONA		Wed., Sun. 11:30

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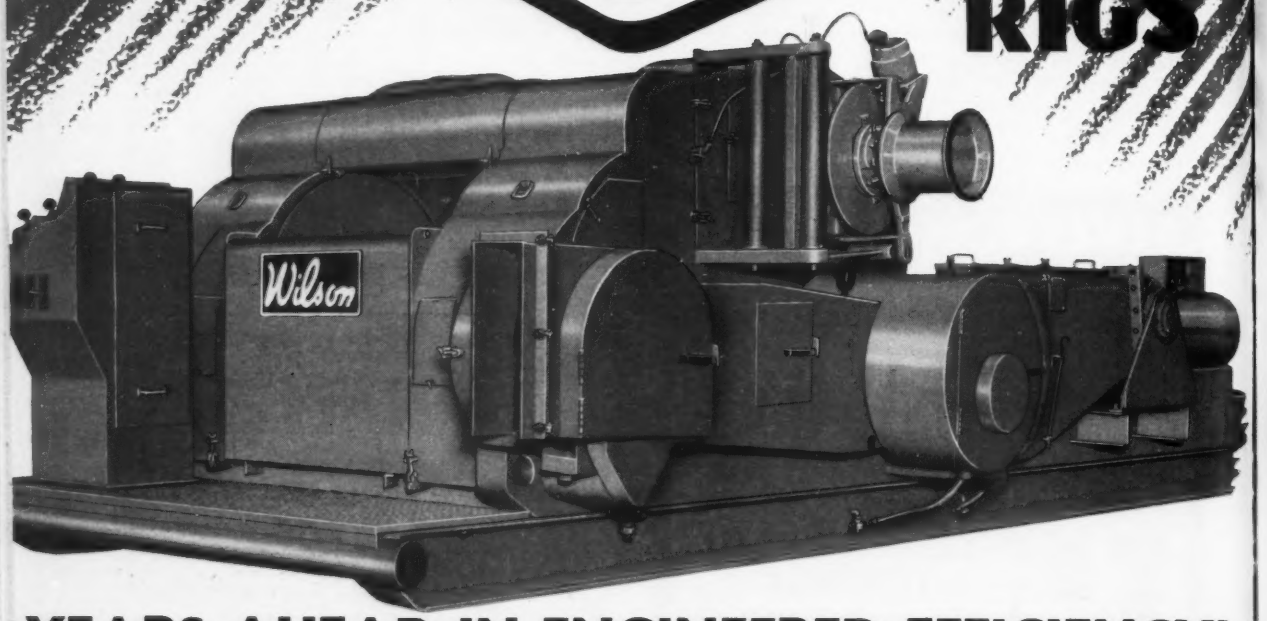

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- **Complete torque converter drives.**
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Among the

Drilling Contractors

Schabarum, Jensen Elevated By King Drilling Co.

B. R. Schabarum has been named general manager and C. J. Jensen general drilling superintendent for Carl B. King Drilling Co., Midland, Tex. Schabarum, formerly manager of engineering and equipment, will take over duties previously directed by J. E. Warren, who continues as president of the company, while relinquishing some of the executive operating duties. Jensen has been serving as drilling superintendent.

Delta Drilling Co. will drill Lone Star Producing Co. 1 D. Murphy, a Woodbine sand wildcat on a 254-acre tract in the T. J. Rusk Survey, northeast of Jacksonville in Cherokee County, East Texas. Location is on the Tecula block.

Harold Shuck will drill Norman L. Stevens 2 E. J. Rivard, SW SW NW 31-1n-15w, Allegan County, Michigan.

Signal Drilling Co. will drill Dyer & Rice 1 Trindle wildcat in Larimer County, Colorado.

Grace Drilling Co., Houston, is moving a rotary rig to Brooks County, Georgia, to drill D. E. Hughes 1 E. M. Rogers in Lot 454, Land District 12, about 13 miles northwest of Quitman, Ga.

M. D. M. Drilling Co. has contract for Leonard Deay-Reusch 1 Oliver S. Ogle, a 2,700-ft. well in SW NE SW 32-8n-9w, Sullivan County, Indiana.

Newman Brothers Drilling Co. will drill 1 T. H. Cherryhomes in the L. L. McKinley Survey in Jack County, Texas, for a 5,899-ft. test. The location is 5 miles southwest of R. B. Thrift, Trustee, 1 Blocker in the Gorman Survey.

Deep River Drilling Co. has contract for J. O. Mutch 1 Louis and Sarah Klein, SW NE NW 12-19n-3e, in Arenac County, Michigan.

General Petroleums, Ltd., Calgary, Alta., has contract for McColl-Frontenac and Texas Co. joint wildcat near Onoway, about 18 miles northwest of Edmonton. Derrick has been completed on the site in LSD 16, 18-54-27w4.

Commonwealth Drilling Co. is drilling at the Saskatchewan Federated Cooperatives, Ltd. 10 Leduc in LSD 1, 19-50-26w4, about ¼ mile south of the company's recent D3 zone success.

E. M. Shields has contract for Socony-Vacuum Oil Co. A-1 State-Billings, NE SW SE 2-17-1e, Gladwin County, Michigan.

F. J. Fleming will drill Ashland Oil & Refining Co. 2 Catherine Dausman, a 3,000-ft. well in the McClosky limestone in NW SE NE 5-7s-12w, Posey County, Indiana.

Day and evening crews of Arrow Drilling Co. on location at Lindsay, Okla., drilling for Carter Oil Co. The men are: B. R. Hicks, Kenneth Griggs, Rex Beal, C. R. Kinder, Troy Bungower, Woody Moore, driller, George Hicks, Jr., Continental Supply Co., O. M. Davy, driller, H. J. McConnell, S. E. Herdson, and Buddy Floyd

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For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

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ELECTRIC OIL SAMPLE HEATER

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The heater embodies the following features: explosion proof; thermostatically controlled; adjustable dry heat; two models; one for 15 CC API tubes; one for 100 or 200 CC ASTM tubes; furnished with or without covers. K. W. Rating 200 Watts. Additional information on request.

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Big West Drilling Co., Dixie Drilling Co., Spartan Drilling Co., Dallas, Tex.

BIG WEST DRILLING CO., its affiliate, Dixie Drilling Co., and its associated company, Spartan Drilling Co., all make their main headquarters on the sixth floor of the National Bank Building, Dallas. Big West, owned and operated by the partnership of Grady Vaughn, Sr., and W. H. Klein, has drilled rigs in the West Texas, Louisiana, and Mississippi areas. Operations in Louisiana and Mississippi are carried on by Dixie Drilling Co. under the direction of the same two men. Spartan Drilling Co., which operates in Louisiana and Arkansas, is owned by Grady Vaughn, Jr., and Jack C. Vaughn.

Growth.—Big West was organized in 1936 with four medium-duty rigs operating in South Louisiana and Arkansas. Its founders were both widely known oil men with a great deal of industry experience. Grady Vaughn, Sr., is credited with drilling several of the country's most important discovery wells, and holds extensive production in his own name in West and North Central Texas and North Louisiana. W. H. Klein was previously associated with Stanolind Oil & Gas Co., Tulsa, as general superintendent.

At present Big West has 13 rigs operating, ranging from medium to heavy-duty, with both steam and power units represented. Spartan has six rigs running and owns production in the area of its operation.

Personnel.—R. U. Maddox, with headquarters in Dallas, is assistant manager for Big West and Dixie operations. He is a member of the accounting committee of the American Association of Oilwell Drilling Contractors. Gus Layton, with offices in Fort Worth, is Big West drilling superintendent for West Texas operations. Grant Lindsey, located in Houston, directs Dixie's drilling in Louisiana and Mississippi.

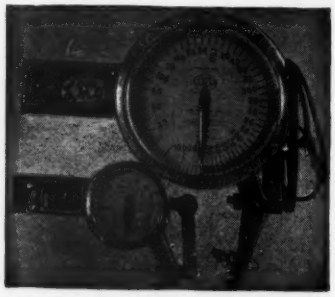
Union Rotary Corp. will drill Sohio Petroleum Co. 1 Kinney-Martyn et al, NE 26-10n-3w, Gratiot County, Michigan.

Penrod Drilling Co. will drill Placid Oil Co. 1 Winston in W. D. Perry Survey, Harrison County, East Texas. It is the first Cotton Valley confirmation test in Longwood field that was extended into the county from Caddo Parish, Louisiana, by Phillips Petroleum Co. 1 Hammack. Location for the second well is 1½ miles northwest of the Phillips discovery. Under the terms of its farmout from Gulf Oil Corp., Placid is to drill a second test if the Cotton Valley is productive.

Guy Mabee Drilling Co. has contract for Slick Oil Co. 1 G. A. Gulley, northeast of Section 118 in C. Hobbs Survey, 4 miles south of Ballinger, Runnels County, Texas.

Parker Drilling Co. has contract for Amerada Petroleum Corp. 1 Nelson, a 10,500-ft. wildcat in C SE NE 20-1n-4w, 6 miles north of Barlow, in Copiah County, Mississippi.

LINE SCALES



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Type "AC" Tubing Anchor

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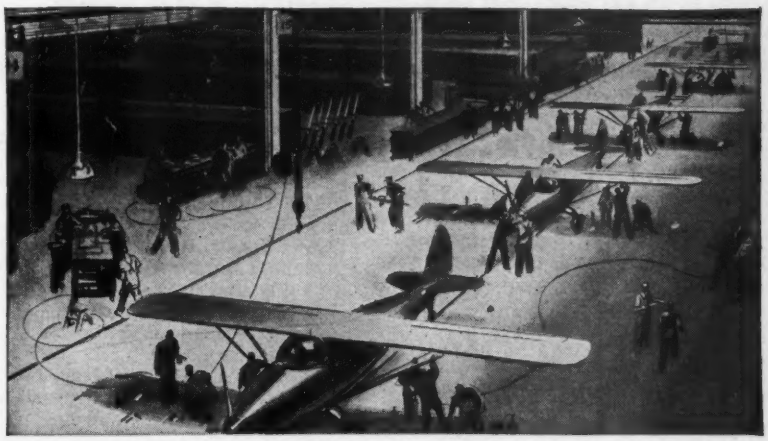

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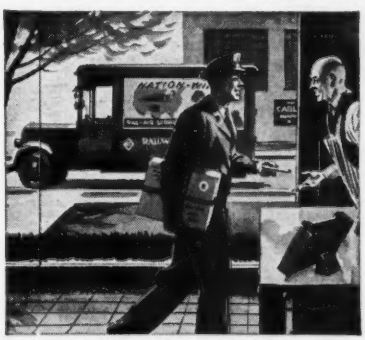

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NATURAL GAS

FPC Report Shows Steady Rise in Demand for Gas

DEMANDS for natural-gas service, ever increasing, continued to rise during 1948, the twenty-eighth annual report of Federal Power Commission reveals. Increases in demands for this product and its facilities resulted in making 1948 one of the "most active" in FPC's history, the commission reports.

The report covers the fiscal year ended June 30, 1948. It says that while the number of certificates issued during the year authorizing construction of interstate natural-gas transmission facilities dropped to 98, as compared with 132 in fiscal 1947, projects authorized in 1948 were on the whole "more extensive and costly than ever before."

The year's authorized facilities involve construction of nearly 8,500 miles of new pipe lines; the addition of more than 500,000 hp. at compressor stations; and the potential expenditure of more than half a billion dollars, according to the report.

The report notes a 1948 drop from the previous year's record number of applications for certificates of public convenience and necessity under the Natural Gas Act, but points out that the number of formal filings of all types nearly doubled and the number ot notices and orders served on individual parties to proceedings rose to nearly 60,000 as compared with approximately 22,000 in 1947 and about 17,000 in 1946.

This trend toward more widespread participation in individual proceedings is described as "an index of the increasingly far-reaching ramifications of recent developments and proposals in the field of interstate transmission and sale of natural gas."

Other subjects covered in the report include accounting activities, rate regulation, corporation regulation, and natural-gas investigation, legislation and court decisions, concerning Federal Power, and Natural Gas acts, changes in regulatory procedures, and FPC cooperation with states and municipalities.

Attempt to Reopen Gas Case Before FPC Fails

The city of Indianapolis, Inc., failed in an effort to reopen proceedings on applications of Texas Gas Transmission Corp., and Texas Eastern Transmission Corp., for permission to build natural-gas pipe lines.

The commission denied the city's petition to reopen the proceedings and to consolidate them with an Indianapolis application for an order directing that Texas Eastern or Panhandle Eastern Pipe Line Co. permit the city to connect with its natural-gas facilities.

Testimony on the Texas Eastern and Texas Gas applications was heard last fall and winter, and oral arguments were given on February 24 in Washington. Case is now before the commission for final decision.

In denying the petition, the commission said the city did not take part in the hearing or seek to become a party to the proceedings before the case had been submitted to the commission for decision. In view of this, FPC said, the Indianapolis action was "not timely."

Southern Gas Association's Meeting in Biloxi April 20

Delegates to the forty-first annual convention of the Southern Gas Association at Biloxi, Miss., on April 20-22, will hear an address by Gen. Ira C. Eaker, retired, discussing Russia's capacity and leadership. Gen. Eaker is now vice president of Hughes Tool Co., Houston.

Over 1,100 representatives of the gas industry are expected to attend the convention which has headquarters in the Buena Vista Hotel at Biloxi. They will have an opportunity to participate in many scheduled panel discussions.

Highlights of the convention are as follows:

Wednesday, April 20: C. L. Morgan, United Gas Corp., will preside over a corrosion round table; W. V. Smith, Oklahoma Natural Gas Co., will conduct an accident-prevention round table; Ross Walker, United Gas Corp., will direct an industrial-sales round table; and C. H. Sanders, Cooper-Bessemer Corp., Dallas, will speak on the "Dual Fuel Engine."

A transmission session also on Wednesday will be conducted by Luther Tolbert, Lone Star Gas Co. Speakers at this meeting are as follows: "Cathodic Protection of Transmission Systems," by G. R. Olson and H. V. Beezley, United Gas Pipe Line Co.; "Removal of Condensable Vapors from Natural Gas Before Entering Transmission Systems," by Dr. Frank H. Dotterweich, Texas College of Arts and Industries; "Right-of-Way Problems," a panel discussion; and the showing of a pipe-line construction film.

Thursday, April 21: Accounting sessions, under the chairmanship of J. B. Cookenboo, Houston Natural Gas Corp., will continue through Thursday afternoon. A general session in the morning will hear an address by Wister H. Ligon, Nashville Gas & Heating Co.; a report by Robert R. Suttle, managing director of the Southern Gas Association; and addresses by D. A. Hulcy, vice president, American Gas Association, and Harrison Jones, Coca-Cola Co.

Friday, April 22: General Eaker's address, "About Russia."

Natural Gasoline

N.G.A.A. Group Meets in Fort Worth April 20-22

The twenty-eighth annual convention of the Natural Gasoline Association of America will be held in Fort Worth April 20-22, at the Texas Hotel, and a number of papers designed for the benefit of members in increasing their knowledge in L.P.G. testing, handling, and production, will be presented.

In addition to regular morning and afternoon sessions, the meeting will climax with an "Information Please" open discussion, with James E. Pew, head of the natural-gas department, Sun Oil Co., Philadelphia, as moderator.

N.G.A.A. President C. R. Williams and Secretary William F. Lowe will be assisted by the following program committee members in carrying out convention plans: F. B. Haverfield, Continental Oil Co., Ponca City, Okla.; R. W. Heath, Signal Oil & Gas Co., Los Angeles; F. P. Peterson, Jr., Southern Minerals Corp., Corpus Christi; Fred H. Townsend, Lone Star Producing Co., Dallas; Albert H. Weil, United Gas Pipe Line Co., Shreveport; and Harry Wheeldon, Shamrock Oil & Gas Corp., Amarillo, Tex.

The complete program follows:

April 20: "Modifications in L.P.G. Test Methods," by H. A. Montgomery, Warren Petroleum Corp., Houston; "Accuracy of Low Temperature Fractional Analysis of Liquid Hydrocarbon Mixtures," by A. J. Miller, Phillips Petroleum Co., Bartlesville, Okla.; "Tests for Determining the Liquid Content of Field Gases," by W. H. Vaughan, Tide Water Associated Oil Co., Houston; "Testing for Sulfur Compounds in Liquefied Petroleum Gases," by J. L. Thompson, Lone Star Producing Co., Dallas; "Cures for Corrosion in Gas-Condensate Wells," by W. H. Stewart, Sun Oil Co., Beaumont, Tex.

April 21: "Performance and Efficiency of a Gas-Cycling Operation," by Ralph Hock, Cotton Valley Operators Committee, Cotton Valley, La.; "Hypersorption," by Dr. Clyde Berg and R. G. Fairfield, Union Oil Co., Los Angeles; "Job Training to Increase Operating Personnel Inventory," by J. C. Harris, Stanolind Oil & Gas Co., Tulsa; "Trends of the Times," by Richard Wagner, president, Chicago Corp., Chicago; "Progress Report on Anti-Detonant Injection in Automotive Engines," by C. H. Van Hartesveldt, Thompson Vita-Meter Corp., Cleveland; "Some Warnings for the L.P.G. Manufacturer," by Howard Felt, vice president, Warren Petroleum Corp., Tulsa.

April 22: "Information Please," an open forum.

Pictured is a UNI Flow M for Ch Tree s Each fit this as can be nished in chrome a resist g densate sion.

CHRISTMAS TREE CORROSION CAN BE STOPPED!

Here is encouraging news in the fight against gas-condensate corrosion. The above pictures graphically illustrate how a UNIBOLT high-chrome alloy steel flow bean was unaffected by exposure for more than a year to the same corrosive condensate that practically ate up a plain carbon steel bean in forty-five days.

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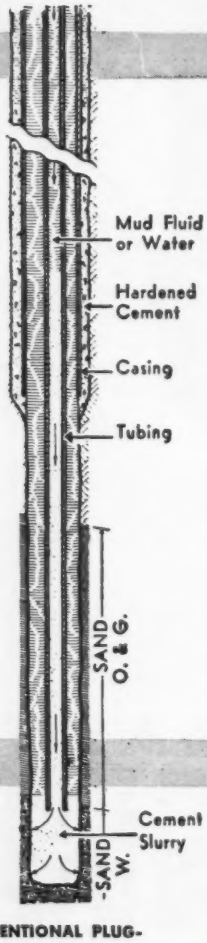

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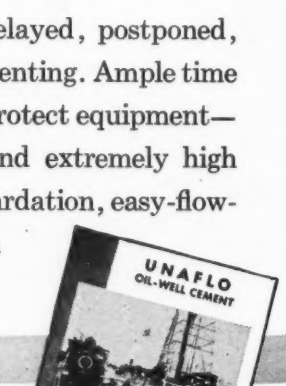

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Exploration and Drilling

Sedimentology Research Commands Respect

IF comments and reactions in the Gulf Coast area are typical, the symposium on Gulf Coast sediments at the St. Louis exploration societies convention resulted in some new converts to the idea of research in sedimentology, and strengthened the convictions of those who were already sold.

From a strictly scientific angle, there is no reason why the Gulf Coast reaction should not be typical. The work in the Gulf Coast is attacking problems that are common to geologists and exploration men everywhere. It just happens that the Gulf Coast is the simplest and least complicated place to try to unravel these particular secrets of nature. *(See The Oil and Gas Journal, December 23, 1948, page 55.)* So, these geologists from other areas who were interested in checking up on the idea are probably reacting in about the same manner as their Gulf Coast brethren.

But there is also a new type of interest noticeable here and there in the coastal area. Among the various slides presented along with the papers at the symposium, there was one that was unusual. It showed the distribution of oil produced to date by areas along the coast and tied this directly to certain geological and sedimentology features.

In the audience there were apparently present some of these men with photographic memories. (Everybody has heard of exceptional detectives, or hat-check attendants, who never forget a face, because they have a photographic memory for faces. Not so well known outside exploration circles is the fact that quite a few exploration men have a photographic memory for maps. Let them look at a map for a few minutes, and later they can do a remarkable job of duplicating it from memory.)

It is a fair guess that some of those who are just recently displaying some interest in sedimentology research have been shown a memory map of the relationship of oil production to both sedimentology and major geological features. Those who saw the slide will easily recall the two sharply pointed triangular areas made by the graphic presentation of oil production. They will also recall that west of a certain area, the Marginulina-Frio oil production was so big a part of the total, and so good over such a wide area that it is little wonder it has such a good reputation. But even in the Marginulina-Frio there was one sharp break on the west, and a tapering to the east.

The shaded part representing the Wilcox-Yegua oil, on the other hand, also showed two triangular areas. But the triangles were much steeper slopes, a triangle with a narrow base and long high sides. They represented a substantial amount of oil in a comparatively narrow band at right angles to the coast.

Even a layman could grasp the fact that the sedimentologists were on the track of something that already displayed signs of promise. The pictures they were drawing on a broad-area basis, combining sedimentology with geology, were showing unsuspected relationships between the size of oil fields found and their sedimentology classifications.

Undoubtedly those familiar enough with Gulf Coast oil fields were able to tie in a memory map with specific fields sufficiently well to have a rough idea of about what grouping of fields north and south were included under the peak production. Or, if they have a memory map, they are able by now to figure out just about where a lot of good oil fields tie in with the sedimentology plus the regional geology. That may account for the sudden interest some of them are now displaying in more research along these lines.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

ROCKY MOUNTAIN AREA.—Gas was recovered on test in the first Frontier at Stanolind Oil & Gas Co.'s North Badger Basin wildcat, Park County, Wyoming, indicating possibility of production in the second and third sands of this formation. Atlantic Refining Co.'s discovery at Riverton, Fremont County, Wyoming, flowed 16½ bbl. of 48.2°-gravity oil per hour through choke from the Tensleep, and is being completed in that formation. Superior Oil Co. is now reported drilling below 18,048 ft. at its Pacific Creek wildcat, Sweetwater County, Wyoming, with the well more than 3,000 ft. deeper than the previous Rocky Mountain depth record.

WEST TEXAS.—Humble 1-B Moore, Scurry County Ellenburger strike, kicked off after acidizing and made a small flow of oil. Humble 1 Parrott, SE SE 3-Y-EL&R, Upton County, ½ mile north of Benedum Pennsylvanian discovery, is to be deepened. The well was originally drilled to 10,744 ft. in 1945.

NORTH TEXAS.—Jack Grace 1 Campsey, 9 miles north of Jacksboro, gaged 30 bbl. of 50°-gravity oil in 3 hours from the Bend conglomerate at 5,492-5,504 ft., after acidizing. The discovery is 14 miles northwest of the Grace Ranch field, nearest conglomerate production. Southwest of the Thrift conglomerate discovery, Wright, Clark & Senkel 1 Hart-Lewis, Jack County, encountered a heavy gas flow on a drill-stem test at 5,054-75 ft.

NORTH LOUISIANA.—Sam E. Wilson, Jr., 1 Crichton, SE SE SE 34-18n-9w, opened a new pay in the Sibley field, Webster Parish. It completed in the field's regular pay, the Rodessa, and also flowed 5,000,000 cu. ft. of gas daily plus 15 bbl. of distillate per 1,000,000 cu. ft. from the James lime at 5,636-45 ft.

CANADA.—Alberta has another new pool, opened by Superior-Joseph Lake 1, a Viking sand discovery 22 miles east of the Leduc field.

PERMIAN BASIN

Old Well Recovers Oil On Test of Deep Zone

MIDLAND.—In the Cedar Lake field of Gaines County, Stanolind Oil & Gas Co. 15 American Warehouse Co., 1,650 ft. from south and east lines, 5-H-D&W, had total depth at 12,370 ft., and apparently had made no other tests below 12,217-12,350 ft. A test at that interval, open 2 hours, recovered the 1,800-ft. water blanket, cut with oil and gas, 180 ft. of clean oil (estimated at 38° gravity), and 720 ft. of heavily oil and gas-cut mud. The section tested was said to be dolomite, and believed to be Devonian. The well was originally drilled in 1945 and abandoned at 11,954 ft. Nearby wells produce from the San Andres around 4,760 ft.

In the southeastern corner of the county Magnolia Petroleum Co. drilled to 13,271 ft. in the Ellenburger, and was circulating while awaiting orders. Further tests had not been reported since the well recovered sulfur water on a drill-stem test from 13,100-30. Location is NW NW, Tract 16, League 273, Loving CSL.

In northwestern Gaines County, Argo Oil Co. 1-C Jones picked tentative top of the Devonian at 11,360 ft., and was drill-stem testing to 11,400 ft. Location is in 32-AX-PSL about 1⅞ miles northwest of the company's 1-N Jones, Devonian discovery completed last year. Argo's 1-B Jones, west and slightly south offset, 31-AX-PSL, had total depth at 10,930 ft. in the Mississippian and was straightening hole.

Stanolind's 2 J. F. Edwards, 13-L-PSL, Cochran County Devonian discovery, was reported ready to complete after showing for a pay section of 128-ft. thickness topped at 10,827 ft. On the last test, from 10,914-55 ft., with packer at 10,914 ft., the well flowed water blanket in 34 minutes, oil in 53 minutes, and in the two following hours tanked 35.29 bbl. and 35.98 bbl. Operators were pulling drill pipe.

In Scurry County, Lone Star Producing Co. 1 M. M. Maule, SE SE 451-97-H&TC, prepared to drill ahead to the Ellenburger, after failing to find commercial oil in testing back up the hole from 7,190 ft. to 5,900 ft. It is the most northwesterly well in the Canyon lime field north of Snyder. Further northwest of the 1 Maule, Humble Oil & Refining Co. 1-B B. A. Moore, SW NE 492-97-H&TC, prepared to swab after perforating casing at 8,200-40 ft. in the Ellenburger. It was that section which recovered some 400 ft. of clean oil on a drill-stem test. Sulfur water was encountered in drilling to 8,405 ft.

Humble's 1 Walter Huddleston, west offset to its 1 Bishop, discovery well of the Diamond M field, was drilling ahead below 3,627 ft. It developed no shows on a test from 3,005-3,230 ft.

Additional Silurian production for the Benedum field of Upton County was indicated at Humble 1-B Barnett, NW NW 29-H-TCRR. Operators ran the swab four times on perforations of the Fusselman section at 11,375-11,420 ft., after which the well kicked off and started flowing load water. It was allowed to clean into pits for 30 minutes, then turned into tanks on ¼-in. choke. In 17 hours it gaged 150.8 bbl. of 61.5°-gravity oil. There was no formation water, and shakeout during the first 16 hours was 0.3 per cent basic sediment. On the last hour, the flow was cut by 15-20 per cent drilling fluid. Flowing tubing pressure was 1,900 psi., and gas-oil ratio was around 7,500 cu. ft. Location of the well is 1¼ miles west and slightly north of Republic Natural Gas Co. 1-A Barnett, Fusselman discovery in the field.

WEST TEXAS (DISTRICTS 8 & 7-C) SUCCESSFUL WILDCATS

Crane County: George T. Abell 1 State-Pecos River Bed, 24-1-H&TC, flowed 260 bbl. 42°-gravity oil a day, ¼-in. choke, Waddell sand 5,405-5,789 ft., GOR 596 cu. ft., TP 200 psi., TD 5,860 ft.

Midland County: Tex Harvey Oil Co. 1 Mrs. B. W. Floyd, approximately SE NE 16-37-T&P, 13 mi. SE Midland, pumped 135 bbl. 40°-gravity oil, 13 bbl. wash water, in 24 hr., Clear Fork pay 7,865-75 and 8,045-55 ft., TD 12,063 ft., PB 11,944 ft., elev. 2,603 ft., Ellenburger 11,940 ft.

Terry County: Seaboard Oil Co. of Delaware 1 E. M. Hinson, NW NW 91-4X-ELRR, 10 mi. E Brownfield, NW of 5,670-ft dry hole, pumped 150 bbl. 43°-gravity oil a day, 20 bbl. salt water, Pennsylvanian 9,405-55 ft., GOR 450 cu. ft., TD 11,845 ft., PB 9,433 ft.

Upton County: Magnolia Petroleum Co. 1-A TXL, NW NW 31-40-T&P, S of Midland county line, 10¼ mi. E of NW corner Upton County, Pegasus field, flowed 975 bbl. 53°-gravity oil a day, ½-in. choke, perforations in Ellenburger 12,700-760 ft., TD 13,295 ft., PB 12,825 ft., top Ellenburger 12,530 ft., elev. 2,890 ft.

WEST TEXAS (DISTRICTS 8 & 7-C) WILDCAT FAILURES

Gaines County: Cabot Carbon Co. 1 S. E. W. Bice, 2-C31-PSL, 2½ mi. SE Adair field, dry, TD 4,977 ft., anhydrite 2,130 ft., Yates 3,040 ft., dolomite 4,010 ft., elev. 3,170 ft.

McCulloch County: M. L. Happal 1 C. B. Kyzar, Sec. 126, E. C. Saunders Sur., 9 mi. SW Brady, dry, TD 1,862 ft.

Pecos County: Basin Oil Corp. 1 Jasper CSL, League 104, Jasper CSL, dry, TD 3,030 ft., anhydrite 1,315 ft., salt 1,535 ft. C. S. Messinger 1 Rooney Estate, 18-140-T&St.L., 18 mi. SE Imperial, dry, TD 1,704 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—In the Crossroads field, Mid-Continent Petroleum Co. 1-B Sawyer, NE NW 34-9s-36e, had pumping equipment rigged up. On what was apparently the first 24-hour gage, recovery was 180 bbl. of oil. Operators believed a part of that amount was accumulation of oil over the past several days. Total depth is 12,750 ft., in the Mississippian according to field reports, plugged back to 12,474 ft. Southwest of the field, Amerada Petroleum Corp. 1-CA State, 9-10s-36e, recovered 2,000 ft. of water blanket and 60 ft. of mud with no shows, in 1 hour and 20 minutes. The test was run from 10,689-732 ft. in unidentified formation. Drilling continued below 10,805 ft.

Humble Oil & Refining Co. 1-X State, 31-11s-35e, had tentative top on the Abo section at 7,650 ft. It was drilling shale below 7,830 ft.

Amerada 1-BTA State, 2-12s-33e, recovered mud on a 4-hour test from 9,585-9,646 ft. It was reported in the Pennsylvanian in drilling below 10,148 ft. Top of the formation had not been picked. Rotary tools were being moved in at Amerada's 1-BTB State, NW NW 26-12s-33e.

McAlester Fuel Oil Co. 1 J. M. Denton was below 3,245 ft. on a new 11,500-ft. wildcat in 11-15s-37e, 14 miles northeast of Lovington.

Amerada 1 J. R. Hamilton, NE SW 35-16s-38e, had total depth at 12,252 ft., in the Mississippian according to operators, with no tentative top at 11,185 ft. Elevation is 3,707 ft. Another observer called the top at 11,840 ft.

Kewanee Oil Co. 36 Baish, 28-17s-32e, in the Maljamar San Andres field, swabbed water from perforations at 8,972-78 ft., after acidizing, then squeezed and reperforated at 6,653-65 and 6,678-90 ft. Plugged-back depth was 10,020 ft.

A 1-hour drill-stem test, apparently in the Fusselman, from 11,547-647 ft. at Phillips 1 Shipp, 20-18s-37e, recovered 5,500 ft. of sulfur water and some drilling mud. It continued drilling below 11,789 ft. in dolomite.

Stanolind Oil & Gas Co. 1 South Mattix Unit, SW NE 15-24s-37e, recovered 90 ft. of slightly gas-cut mud on a 1½-hour drill-stem test at 8,981-9,033 ft., then cored ahead below 9,033 ft. Operators' top on the McKee was 9,010 ft.

Phillips 1 McCormick, 18-25s-35e, prepared to core at 6,818 ft. after a 75-minute drill-stem test from 6,667-6,730 ft. Recovery was

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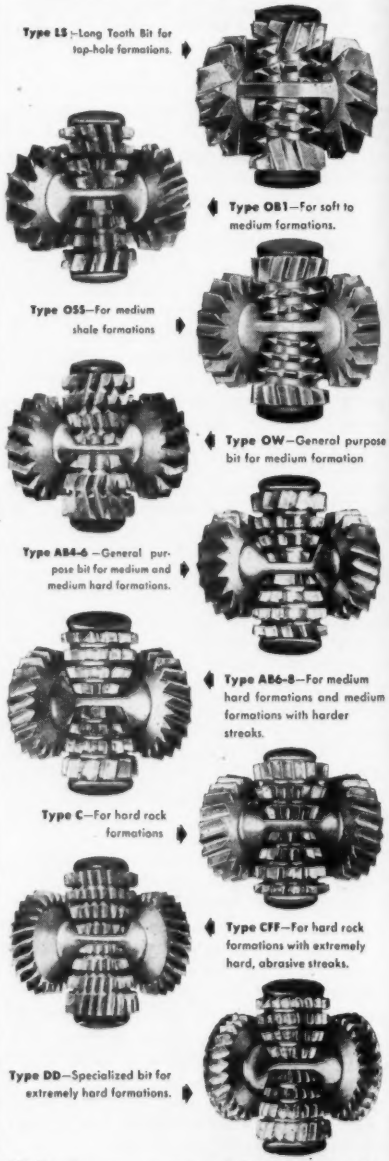
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SOUTHEAST NEW MEXICO WILDCAT FAILURE

Eddy County: Mesa Retailers, Inc., 1 Blindsnake, NE NE NW 2-16s-25e, dry, TD 5,065 ft., Glorietta 1,718 ft., Clearfork 1,744 ft., Tubbs 3,190 ft., Abo 3,780 ft., Pennsylvanian 4,965 ft., elev. 3,449 ft.

EASTERN TEXAS

Humble Gets Discovery, Confirms Another

DALLAS.—Humble Oil & Refining Co. ran completion tests on one discovery and one confirmation well. Four miles north of the Sand Flat Paluxy and Rodessa field, Smith County, Humble 1 Winters, William Price Survey, completed for a daily potential of 320 bbl. of 44°-gravity oil, flowing through ½-in. choke from perforations in the Rodessa section of the lower Glen Rose at 9,368-74 ft. and 9,378-9,404 ft. Flowing tubing pressure was 510 psi. Gas-oil ratio was not available at last report.

Humble's other producer, in southern Smith County, was its 1 Sherlock, Oliver Anderson Survey, northeast offset to the discovery of the South Tyler Paluxy sand field, which flowed 231 bbl. of 28°-gravity oil in 24 hours. The flow was through ¼-in. choke from perforations at 7,618-30 ft. and 7,643-49 ft. Flowing pressure was 45 psi. on tubing. Operators planned to pump the well.

Stanolind Oil & Gas Co. 1 Walton Deupree, Henderson County wildcat southeast of Athens, which has been intermittently swabbed and shut in, with only salt water and light shows of gas recovered from Rodessa perforations from 10,250-309 ft., was scheduled for abandonment. Total depth was 11,728 ft., plugged back to 10,309 ft.

Morris Coats 1 G. M. Scott, Allen Samuel Survey, spudded in and prepared to set surface casing. It is a Paluxy sand wildcat, located 3 miles southeast of production in the Talco field of Titus County. Location is on a farmout from Stanolind.

In Cass County, Humble's 12,000-ft. wildcat, the 1 S. V. Guerin, 10 miles north of Linden in the James Frazier Survey, was waiting on cement after setting 765 ft. of surface pipe.

In the Yantis field, Wood County, Humble 1 McDowell Unit 2, Walker Survey, was scheduled for completion, as the field's second Rodessa gas-distillate producer. It gaged 47,500,000 cu. ft. daily, plus 80 bbl. of distillate per 1,000,000 cu. ft., from casing perforations at 8,046-62 ft.

In Van Zandt County, northwest of Canton, Westbrook Oil Co. and Clark & Cowden 1 Mathis-McKinney, Stockwell Survey, picked top of the Woodbine sand at 4,387 ft., with elevation of 527 ft. A core at 4,391-4,407 ft. recovered white sand, with water. It was drilling ahead toward the Paluxy.

In Limestone County, Frazier & Reiter 1 Steubenrauch, Varela League, 4 miles west of Mexia, had total depth at 8,426 ft., in the Cotton Valley, and was attempting to seal off a cavity. It is a Smackover test.

EAST TEXAS (DISTRICTS 5 & 6) WILDCAT FAILURES

Cherokee County: J. B. Dial 1 New Birmingham Development Co., Levi Jordan Sur., 7 mi. SW Rusk, dry, TD 5,188 ft., sample tops: base Austin 4,935 ft., Woodbine sand had some oil, not commercial.

Henderson County: E. L. Howard 1 Mrs. N. L. Gilbert, G. W. Featherston Sur., 5 mi. SW LaRue, dry, TD 4,754 ft., base Austin 4,310 ft., sub-Clarksville 4,314 ft., Woodbine 4,640 ft.

Sabine County: Humble Oil & Refining Co. 1 J. W. Minton, Shadrack Morris Sur., 9 mi. NE Hemphill, dry, TD 7,036 ft., sample tops: Austin 4,945-5,455 ft., Comanche 5,565 ft., Paluxy 5,875 ft., Glen Rose 5,109 ft.

MISSISSIPPI

Hodge Well Encounters New Shallower Sand

JACKSON.—On the southwest edge of South LaGrange, T. F. Hodge 1 E. B. Ogden, Lot 90, Section 41-6n-2w, Adams County, encountered Ogden sand, regular producing horizon, at 6,443 ft. Oil sand was encountered from 4,563-70 ft. Casing has been set at 4,620 ft., and perforations made from 4,558-59 ft. and 4,570-71 ft. These perforations were squeezed and operators plan to perforate and test this sand section.

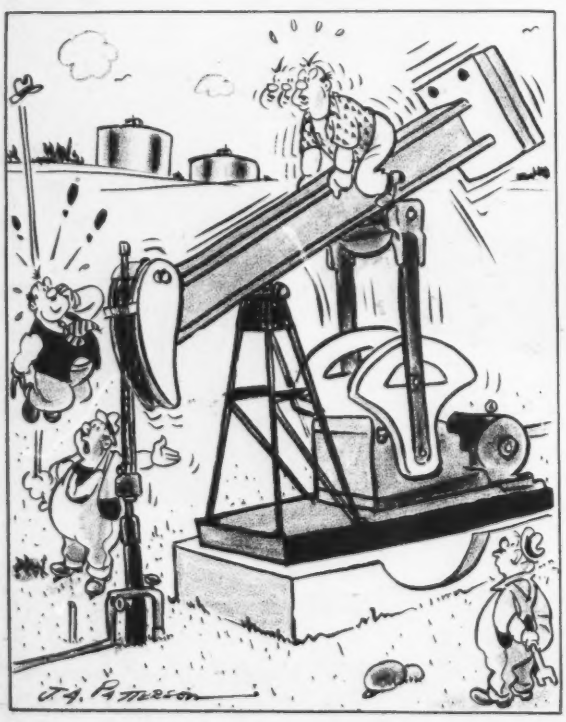
Humble Oil & Refining Co. 1 Bessie Moore, 66-7n-2w, ½ mile north of production at LaGrange field, cored oil sand from 6,068-73 ft. in the Baker sand horizon. On a 10-minute drill-stem test from 6,068-73 ft., using ½-in. top and ¼-in. bottom chokes, recovered 1,560 ft. of 38.4°-gravity oil. Bottom-hole flowing pressure was 1,870 psi. A 10-minute drill-stem test from 6,093-99 ft., using same chokes, recovered 290 ft. of oil, 30 ft. of oil-cut mud and 15 ft. of salt water in 10 minutes. Operators are continuing to core below 6,125 ft.

Humble 1 Gwinville Gas Unit 47, in the Gwinville field of Jefferson Davis County, was completed through perforations at 8,143-73 ft., for an initial production flowing 3,308,000 cu. ft. of gas plus 24 bbl. of condensate per day, through a ¼-in. choke, tubing pressure 2,800 psi., gravity 50°. Total depth is 8,181 ft.

In Mallalieu field, Lincoln County, The California Co. 1 W. I. Bowman et al, 21-6n-8e, flowed 404 bbl. of 37.5°-gravity oil per day through a 19/64-in. choke, tubing pressure 285 psi. Production is from perforated interval at 10,498 - 10,518 ft. Total depth 10,518 ft.

MISSISSIPPI WILDCAT FAILURES

Lawrence County: Humble Oil & Refining



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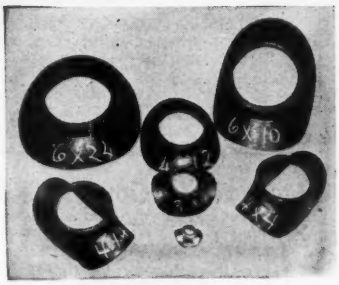

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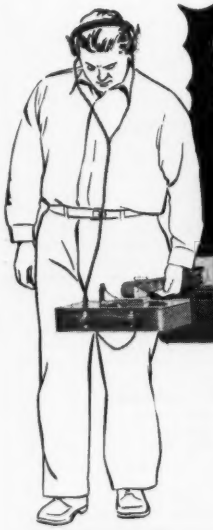

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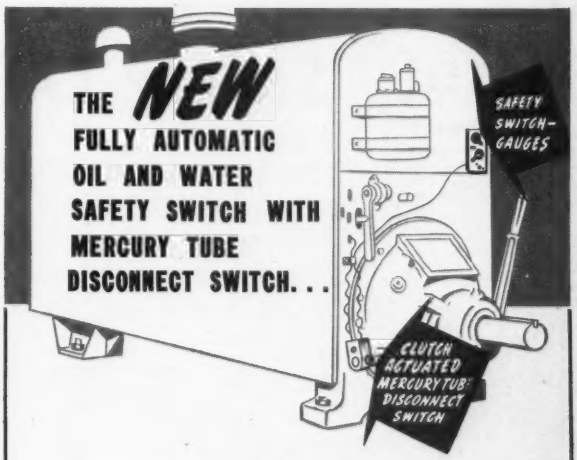

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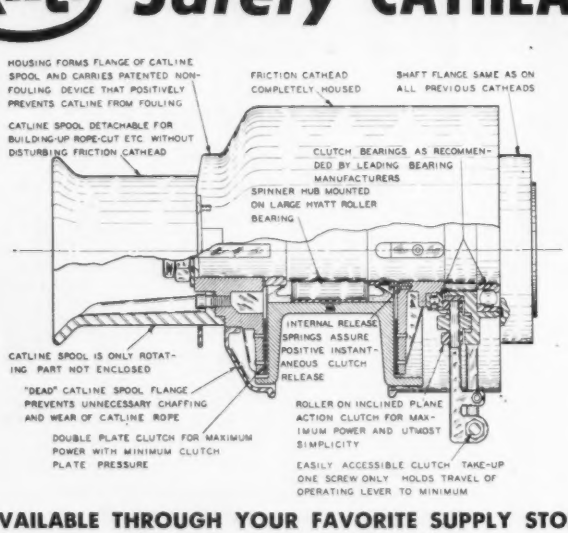
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Co. 1 Tom Hunt et al, 22-8n-10e, dry, TD 10,950 ft., top lower Tuscaloosa 10,304 ft., Massive 10,516 ft., lower Cretaceous 10,648 ft.

Smith County: Martin Harris Drlg. Co. 1 Ray Tramell Unit, 26-3n-8e, dry, TD 7,522 ft., Tuscaloosa 6,125 ft., Marine Tuscaloosa 6,892 ft., Massive 7,198 ft.

ALABAMA WILDCAT FAILURE

Covington County: A. R. Temple 1 Martin-Spicer, 33-5n-16e, dry, TD 4,295 ft., top lower Cretaceous 3,952 ft.

FLORIDA WILDCAT FAILURE

Lafayette County: Coastal Petroleum Co. 1 Ronald Sapp, 18-6n-14e, dry, TD 3,507 ft.

TEXAS GULF COAST

Matagorda County Gets New Discovery

HOUSTON.—A new oil discovery in the Sargent area of Matagorda County has been opened at H. A. Potter 3 Henry T. Freeman, located in the Thomas McCoy & D. Deckro Survey. Well was drilled to a total depth of 6,610 ft., and pipe cemented to 6,350 ft. for tests in the 6,300-ft. sand. Perforations were made in a 5-ft. zone from 6,324-6,329 ft. for the completion. Using 6/64-in. chokes, the test is presently making approximately 80 bbl. of fluid per day, the ratio being 80 per cent oil and 20 per cent fluid. Operators are preparing to make initial gage.

New gas production in the Wilcox sands in the Lissie gas area of Wharton County is being opened by Magnolia Petroleum Co. 1 Louise Mitchell, located in the GH&H Survey, Section 21, 1 mile west of Lissie, and northeast from present gas production. Drilled to a total depth of 9,740 ft., the well tested through perforations at 9,662-9,672 ft. and on a 13-hour test, using ½-in. and 12/64-in. chokes, flowed an estimated 1,365,000 cu. ft. of gas along with 59 bbl. of condensate per day with flowing pressure at 2,045 psi. Gas-condensate ratio ws 23,251. This section was squeezed off and operators are preparing to perforate in the zone from 9,617-42 ft., and 9,582-9,602 ft. for a production test.

P. R. Rutherford & Texas Co. 1 Eugene Cihal, new wildcat discovery approximately 3½ miles northeast of Cordele field, and southeast of the North Cordele gas discovery area, in Jackson County, has been completed as a gas well, but no gage has been reported as yet. Total depth is 5,516 ft., and 5½-in. pipe was run to 4,629 ft. This well is in I&GN Survey 5, approximately 2 miles east-southeast of the North Cordele gas discovery well.

A new gas producing area in the Egypt area of Wharton County is being opened at Claud B. Hamil 1 Northington Unit, located in the T. Heard Survey, Abstract 183, and the Alexander Edgar Survey, Abstract 93. The well came in flowing gas, wash water and mud with pressure of 900 psi., through perforations at 4,287-4,292 ft. It continues to clean into pits. Total depth is 7,840 ft. with 5½-in. casing cemented to 4,700 ft.

TEXAS GULF COAST (DISTRICTS 2 & 3) SUCCESSFUL WILDCATS

Chambers County: Gas discovery, North Oyster Bayou—Sun Oil Co. A-1 Middleton, Sec. 81, E. Moss Survey, approximately ¾ mi. N of Oyster Bayou production, TD 9,707 ft., top sand 9,207 ft., perf. 9,207-10 ft., IP: flowed gas and condensate and shut in, open flow calculated 18,000,000 cu. ft. gas per day, TP 3,250 psi., shut-in pressure 3,485 psi.

Harris County: New oil sand, Humble—Caroline Hunt Tr. Est. 3 Martha O'Connor, J. Dunman Labor, TD 3,592 ft., top sand 3,552 ft. Cook Mountain, perf. 3,556-66 ft., IP: 81 bbl. oil per day, GOR 1,142, gravity 39.6°.

Polk County: New oil discovery—R. H.

Abercrombie 1 W. A. Crum, A. Viesca League, 2 mi. SE of Goodrich townsite, TD 7,792 ft., top sand 7,115 ft., perf. 7,116-23 ft., Wilcox, IP: 200 bbl. oil per day through 9/64-in. choke, GOR 1,465, TP 1,475 psi., gravity 38.2°.

TEXAS GULF COAST (DISTRICTS 2 & 3) WILDCAT FAILURES

Bee County: Dirks Bros. 1 Wilson Est., Bee Co. School Land Sur. 4, 6 mi. W SW of Beeville, 3 mi. W of Yougeen field, dry, TD 5,507 ft.

Calhoun County: The Texas Co. 1 State of Texas Tr. G., State Tract "G," next to Espiritu Santo Bay on Matagorda Island, 10 mi. SE of Seadrift, 6 mi. SE of Duck Bay field, dry, TD 6,333 ft.

Jefferson County: Hunt Oil Co. et al 2 Dishman & Lucas, Wm. McFarland League, 3½ mi. S of Nome production, dry, TD 7,222 ft.

Walker County: Edward T. Robinson 1 J. W. Smith, Wm. Robinson Sur. A-43, 10 mi. SW of Huntsville, dry, TD 7,026 ft.

Wharton County: T. J. Ahern 1 E. E. Engstrom, Mark Weiss Sur., 3 mi. N of So. El Campo, dry, TD 6,613 ft.

ROCKY MOUNTAIN

Stanolind Tests Wildcat In North Badger Basin

DENVER.—Tests in the first Frontier sand at Stanolind Oil & Gas Co.'s wildcat in the North Badger Basin area at 1 Northern Pacific Railroad, NE NE NW 23-58n-102w, Park County, Wyoming, indicate that this well may find production in lower sands of this formation. Top of the first Frontier has been tentatively placed at 9,980 ft., and on a 30-minute drill-stem test at 9,926-91 ft., the well was rated good for 369,000 cu. ft. of gas. Sixty feet of gas-cut mud was recovered on the test of the 11-ft. sand. The operator is now coring ahead for the second Frontier sand, productive in the Badger Basin field proper, 4 miles to the southeast. The Badger Basin field was discovered in 1930 with production at around 8,100 ft., and for several years was the deepest producing field in the Rocky Mountains. Last year General Petroleum Corp. drilled a Madison test on the structure, which was a failure in lower formations. General Petroleum farmed out its seismic prospect in the North Badger Basin area, retaining an interest in the block.

Atlantic Refining Co. 1 Tribal, C SW SE 25-1s-4e (WRM), on the Riverton structure, Fremont County, Wyoming, flowed 16½ bbl. of 48.2°-gravity oil per hour through ¾-in. choke from the Tensleep formation during the past week, for a discovery in this area. The well topped Tensleep at 11,661 ft., and was drilled to 11,884 ft., total depth, still in that formation. Production casing was cemented at 11,666 ft., and tests on various sized chokes were made after drilling plug. On ½-in. choke the well flowed 15½ bbl. of oil per hour for an 11-hour period, with tubing pressure 300 psi. Although there is an estimated 500 ft. of Tensleep sand in this area, Atlantic will not deepen the present well further in this formation. The discovery will be completed at its present depth, and additional drilling is expected on the block. Stanolind, Superior Oil Co., Kerr-McGee Oil Industries, Inc., and others hold acreage in the Riverton area. Atlantic's discovery also had shows of gas in the Frontier formation, and shows of gas and distillate in the Phosphoria lime, but these zones were cased off.

The Rocky Mountain's deepest well is now below 18,048 ft., less than 1,000 ft. from the world's record established near Ventura, Calif. The well is Superior Oil Co. 1 Unit, SW NE SW 27-27n-103w, Sublette County, Wyoming. Superior has a 36,500-acre unitized block in the Pacific Creek area, along the northeast side of the Green River Basin, north of the town of Rock Springs, Wyoming. Operations on the well have been tight below 10,000 ft., where the well was suspended 2 years ago. Lewis shale was topped at 7,600 ft. and Mesa Verde (upper Cretaceous) at 8,434 ft. Operations were resumed on the well last year, and it is believed possible that the well may be drilled below 19,000 ft. prior to completion. Rumored shows of gas, with high pressures, at around 12,000 ft., were not confirmed by the operator.

J. G. Dyer of Denver has abandoned his Loveland, Colorado, wildcat at 1 Trindle, CW½ NW SE 30-5n-68w, Larimer County, after failing to find the gas production tested in Hygiene sand when the formation was drilled. The well was plugged back to 1,925 ft. after finding Frontier, Muddy, and Dakota zones hard and tight. The well went to 5,436 ft., total depth, and casing was cemented at 1,925 ft. for a test of the Hygiene, which made an estimated 4,000,000 cu. ft. of gas on drill-stem tests. Casing was perforated with 164 holes between 1,350-1,920 ft., but tests showed no recovery.

Shows of gas have been logged by Seaboard Oil Co. on its 1 Unit, NW SW NW 10-10s-22e, Uintah County, Utah, and the operator is coring below 8,350 ft. On drill-stem test at 8,144-77 ft., the well made an estimated 1,500,000-2,000,000 cu. ft. of sweet gas, and additional shows have been logged. These shows are in thin Tertiary sands, with no formation tops reported on the well at its present depth. Original contract for the well was reportedly 7,500 ft., but the operator has continued below this depth to check additional sands in the formation.

New locations.—There were 17 new locations, with 11 in Wyoming, 3 in Montana, 1 in Colorado, and 2 in Utah. The Utah locations were wells in the Ashley Valley field, Uintah County, where a Weber sand discovery was made last year. There are now five completed Weber sand wells in the field, and it is indicated there will be

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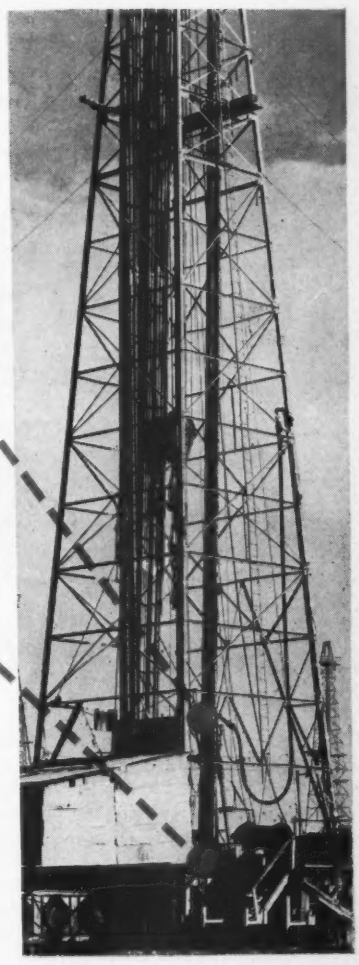

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MUD PRODUCTS, INC.

PHILTOWER BLDG. TULSA 3, OKLA.

considerable development drilling in this field during 1949. Other locations in Wyoming and Montana were for pool wells. McDannald Oil Co. made location for a wildcat at South Hartzel, Park County, Colorado, at 1 Government, C SW SE 1-12s-75w. This well is 4 miles south of a wildcat now drilling below 3,800 ft.

WYOMING SUCCESSFUL WILDCAT

Fremont County, Beaver Creek: Stanolind Oil & Gas 11 Unit, CNL SE 10-33n-96w, flowed 474 bbl. of oil per day, Mesa Verde 1,345 ft. Steel shale 2,563 ft., first Frontier 6,550 ft., second Frontier 6,660 ft., third Frontier 6,757 ft., fourth Frontier 6,956 ft., fifth Frontier 7,085 ft., Muddy 7,780 ft., Dakota 8,012 ft., Lakota 8,085 ft., Morrison 8,145 ft., first Jay Em 8,186 ft., second Jay Em 8,245 ft., third Jay Em 8,295 ft., Sundance 8,345 ft., Nugget 8,662 ft., Popo Agie 8,940 ft., Chugwater 8,960 ft., Alcova 9,210 ft., Dinwoody 10,055 ft., Phosphoria 10,120 ft., Tensleep 10,442 ft., Amsden 10,894 ft.

WYOMING WILDCAT FAILURES

Lincoln County, Afton: Continental Oil Co. 1 Unit, SW NW NW 15-30n-110w, dry, TD 5,108 ft., Nugget 950 ft., Ankareh 1,705 ft., Thaynes 2,228 (?) ft.

Washakie County, Sand Creek: General Petroleum Corp. 65-2 Government, NE NW SE 2-46n-91w, dry, TD 10,352 ft., Frontier 6,182 ft., third Frontier 6,805 ft., Muddy 7,537 ft., Dakota 7,750 ft., Lakota 7,885 ft., Morrison 7,930 ft., Embar 9,438 ft., Tensleep 9,662 ft., Madison 10,142 ft.

Weston County, North Mush Creek: Black Hills Drilling and Carter Oil Co. 1 State, SW SW NE 36-45n-63w, dry, TD 3,475 ft., Niobrara 1,974 ft., Turner 2,364 ft., Greenhorn 2,630 ft., Mowry 3,117 ft., Newcastle 3,400 ft.

Newcastle area: Winkler-Roberts-Phillips 1 Kinney, NE SW SW 33-45n-61w, dry, TD 1,000 ft., Newcastle 939 ft.

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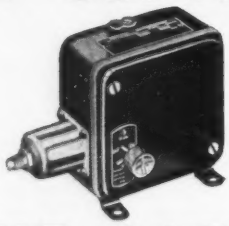
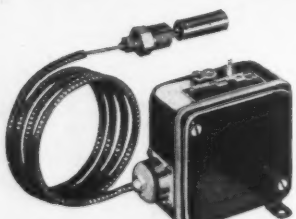
Oil Pressure Control. Dependably protects engine from possible damage caused by oil pressure failure, resulting from clogged or broken oil lines, oil pump breakdown or low oil level. Made in 3 and 4 wire; single and double pole.



AVOID ENGINE DAMAGE



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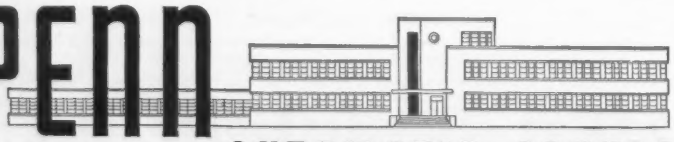

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FOR HEATING, REFRIGERATION, AIR CONDITIONING, PUMPS, AIR COMPRESSORS, ENGINES, GAS RANGES

SOUTHWEST TEXAS

Corpus Christi Bay Well Tests Gas-Condensate

CORPUS CHRISTI. — Atlantic Refining Co. 1 State Tract 436, wildcat test in Corpus Christi Bay, 12 miles south of Aransas Pass, flowed at the rate of 15 bbl. of condensate and 3,241,000 cu. ft. of gas per day through ¼-in. chokes on drill-stem test through perforations at 7,540-50 ft. The test was for 2 hours and developed 2,325 psi. maximum working pressure. Previous test through perforations at 7,590-7,608 ft. had flowed gas, estimated at 416,000 cu. ft. per day with spray of condensate, 1,200 psi. working pressure. Total depth is 9,525 ft., with 5-in. liner at 9,000 ft. This well is located 5 miles south of Ingleside dock, in north corner of State Tract 436, Corpus Christi Bay.

Anderson-Prichard Oil Corp. 1 G. E. Johnson, new shallow oil discovery in Travis County, 6 miles northwest of Elgin, has been gaged at an average of 40 bbl. of oil per day on a 3-day pumping test, and a potential gage is being taken on the completion from open hole at 982-96 ft. This well is located in Pedro Rodriquez Grant, in the east corner of Lot 12.

A new deeper oil pay zone for the La-Gloria field, in Brooks County, is being opened at Magnolia Petroleum Co. 5 Brethren Church located in Lot 4, Block 1, Falfurrias Farm & Garden Tracts. On initial test, it flowed an estimated 4 bbl. of oil per hour through ⅛-in. choke, with 980 psi. Working pressure, through perforations at 9,083-90 ft. The hole had been drilled to a depth of 10,001 ft., and plugged back to 9,275 ft. for the completion.

Anderson-Prichard 1 Johnson, discovery well at "Lund" field, extreme northeastern corner of Travis County, has been gaged at 11.62 bbl. of 36°-gravity oil per day on the pump in potential test from open hole at 982-96 ft.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) SUCCESSFUL WILDCATS

Caldwell County: New oil discovery, Buchanan area—Riddle Oil Co. 1 A. J. Miears, C. M. Cannon Sur., 2 mi. SE of Dale, TD 1,980 ft., PBTD 1,924 ft. (open hole 1,881-1,924 ft. in Dale lime), IP: 2 bbl. oil per day on pump.

Duval County: New gas-condensate pay, Government Wells (Wilcox)—Ralph E. Fair, Inc., & Jack Woodward 1 Luptak, J. Poitevent Sur. 41, top pay 7,660 ft., TD 10,506 ft., perf. 7,660-7,728 ft., IP: 1,950,000 cu. ft. gas per day and 95 bbl. per day condensate through 9/32-in. choke, TP 1,700 psi., SIP 2,750 psi.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) WILDCAT FAILURES

Atascosa County: Carolyn Hunt Trust Est. 1 F. Franzel, F. Anthony Sur., A-15, 1 mi. SE of Weigand field, dry, TD 4,509 ft.

Caldwell County: Harris-Funk Drlg. Co. & R. L. Turner 2 J. W. Gomillion, Gideon Pace Sur., 1½ mi. E SE of Lytton Springs, dry, TD 1,433 ft.

Luling Oil & Gas Co. 1 A. P. Yates, Gideon Pace Sur., approx. ¼ mi. S of Bastrop county line, dry, TD 1,547 ft. in Austin chalk.

Riddle Oil Co. 1 M. M. Dinges, Gideon Pace Sur., 4 mi. N of Dale, dry, TD 1,839 ft.

Tarpon Oil Co. 1 Walter W. Long, Moses Gage Sur., 1½ mi. E of McMahon, dry, TD 3,350 ft.

Wiegand Bros. 1 Austin Nix, Gideon Pace Sur., 1½ mi. E SE of Lytton Springs, dry, TD 1,470 ft.

Duval County: H. R. Smith 1 John Ullrich, Sec. 3, Copita Farm & Garden Tracts, 3 mi. SW of Realitos, dry, TD 5,375 ft.

Smith-Story-Wood Corp. 1 Porfirio Zamora, San Francisco Grant, 8 mi. W of Premont, dry, TD 6,505 ft.

Milam County: Placid Oil Co. 1 Mrs. Eva F. Smith et al, D. F. Friar Sur., 3 mi.

SE of Branchville, dry, TD 5,803 ft.

San Patricio County: Fred M. Manning, Inc., 1 J. W. Crouch et ux, I&GN Sur. A-172, 3 mi. N of Mathis, dry, TD 4,770 ft.

Webb County: Dulaney Oil Co. 2 John W. Ward et al, Jose Borrego Grant, 13 mi. S of Mirando City, dry, TD 1,802 ft.

O. W. Killam 2 G. B. Moglia, Sur. 722, 10 mi. N of Bruni, dry, TD 2,483 ft.

Zavala County: A. J. Bankhead 1 James P. Webb, Robt. H. Kuykendall Sur. 23, 1 mi. E of Batesville, dry, TD 4,610 ft.

SOUTH LOUISIANA

Bay Marchand Gets New Pay

NEW ORLEANS.—A new deep pay for the Bay Marchand field off the Lafourche Parish shore line in the Gulf of Mexico has been opened at The California Co. 2 Louisiana State Lease 1367, Block 2. Drilled to a total depth of 5,703 ft., the pay was topped at 5,020 ft., A string of 5½-in. casing was cemented in the hole to 5,700 ft. and the pipe perforated at four intervals for the completion. Perforations were made at 5,020-24 ft., 5,039-47 ft., 5,050-59 ft., and 5,061-66 ft. The well flowed 320 bbl. of 40.9°-gravity oil per day through a 5/32-in. choke, with flowing pressure on the tubing at 1,040 psi. Gas-oil ratio 422. Location for the 3 State Lease 1367, to be drilled from the same platform, has been announced, with projected depth of 4,000 ft. Noble Drilling Co. remains the contractor for the tests.

A new oil field in the southern Jefferson Parish, is being opened at Tide Water Associated Oil Co. 1 State Lease 1299, Section 35-18s-24e, 7 miles south of Lafitte production, and approximately 25 miles south of New Orleans. This discovery is in the Manila Village area and was drilled to a total depth of 13,007 ft. On initial test, through open hole at 12,985-13,007 ft., the well kicked off and flowed at the rate of 157 bbl. of 40°-gravity oil per day through a 6/64-in. choke with flowing pressure on tubing at 8,050 psi. Gas-oil ratio was 5,300.

Potential gage has been made at Gulf Refining Co. 1 Mermentau Mineral & Land Co., Inc., in Little Chenier gas area of Cameron Parish, and is located south of gas-condensate production in the field, in Section 14-14s-6w. Total depth is 13,260 ft., and perforations from 10,422-10,428 ft. The well flowed 289 bbl. of 37.2°-gravity oil per day through a ⅛-in. choke with flowing pressure on tubing at 1,500 psi. Gas-oil ratio was 1,500.

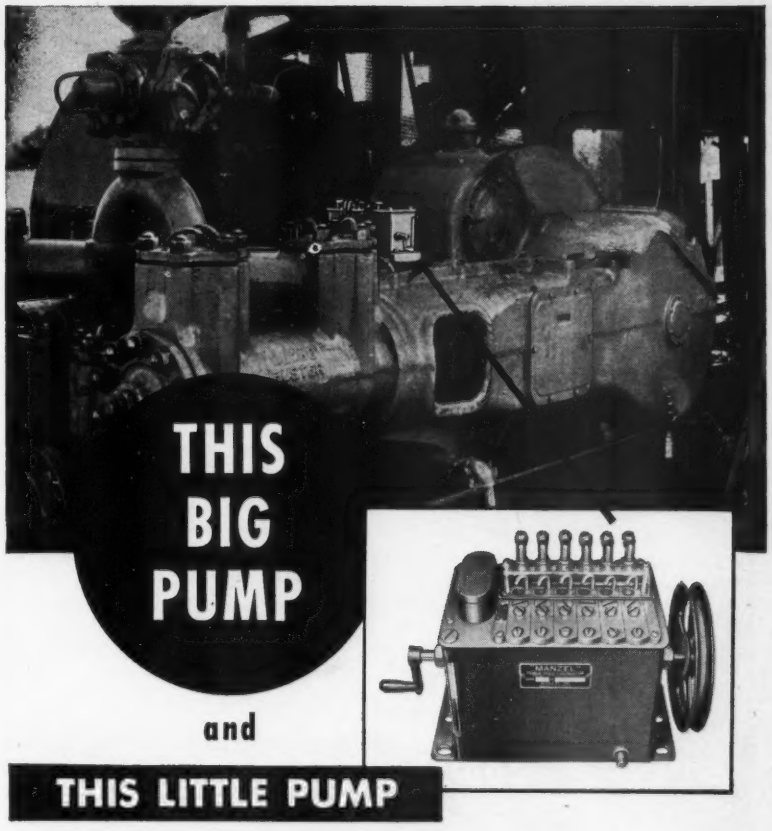
Shell Oil Co., Inc., has cemented a 5-in. liner to a depth of 14,900 ft. in the 4 Smith-State Unit "B," a deep exploration test in Weeks Island Dome area of Iberia Parish, and ready to perforate in record deep sands for the initial test. Test is located in Section 18-14s-6e. Total depth is 14,900 ft., a string of 9⅝-in. protection casing was cemented to 13,898 ft., and liner has been cemented from this point to the bottom. Weeks Island now holds the deepest production record for Louisiana.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Cameron Parish: New oil discovery, Little Chenier—Gulf 1 Mermentau Mining & Land Co., Inc., 14-14s-6w, just S of Little Chenier gas production, TD 13,260 ft., top sand 10,422 ft., perf. 10,422-28 ft., IP: 289 bbl. oil per day through ⅛-in. choke, GOR 1,500, TP 1,500 psi., gravity 37.2°.

Lafourche Parish: New oil pay, Bay Marchand—The California Co. 2 Louisiana State Lease 1367, TD 5,703 ft., top sand 5,050 ft., perf. 5,020-24 ft., 5,039-47 ft., 5,050-59 ft., and 5,061-66 ft., IP: 320 bbl. oil per day through 5/32-in. choke, GOR 422, gravity 40.9°, TP 1,040 psi.

Livingston Parish: New oil pool, Springville—Danciger Oil & Refining Co. 1 Myrtle E. Smiley, 9-7s-5e, 1½ mi. NW of Springville, 15 mi. NE of Mallets



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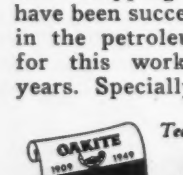

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Bayou production, TD 8,748 ft., top sand 8,006 ft., perf. 8,006-07 ft., IP: 109 bbl. oil per day through 6/64-in. choke, GOR 700, TP 1,100 psi., gravity 43.5°.

St. Martin Parish: New gas-condensate sand, Arnaudville—The Union Sulphur Co., Inc., 1 Hefea Land Co., 38-8s-5e, TD 11,700 ft., top sand 11,059 ft., perf. 11,059-78 ft., IP: 27 bbl. condensate per day through 12/64-in. choke, GOR 92,620, TP 3,800 psi., gravity 47°.

SOUTH LOUISIANA WILDCAT FAILURES

Acadia Parish: Barnsdall Oil Co. 1 M. Vincent, 31-7s-2w, approx. 1 mile E of West Tepetate production, dry, TD 9,300 ft.

Acadia Parish: Roeser & Pendleton, Inc., 1 John Wilfert, 14-7s-1w, SE flank of Ritchie, dry, TD 9,325 ft.

MICHIGAN

Old Well Drilled Deeper Pumps 50 Bbl. a Day

MOUNT PLEASANT.—Deepened from a temporary abandonment point in the Dundee to the Richfield horizon, Ervin Major 1 McQuarrie, NW NW NW 1-18n-3e, Gibson Township, Bay County, was completed natural in that zone good for 50 bbl. of oil a day by pumping. The well was deepened from 2,939 ft. to the new total depth in the Richfield at 4,262 ft.

Exact significance of this Richfield strike will be partially determined when Major has completed his new test in the district, the 1 Scherwin, NW SW NW 1-18n-3e, direct south 40-acre offset. The new Bay County Richfield horizon producer is located about 1 mile southwest of an area in Adams Township, Arenac County, where several semisuccessful Richfield producers were drilled about 8 years ago.

Two new developmental tests in the Isabella Dundee field, Isabella County, were scheduled to be completed within the next 7 days. There are two producing wells in the field now and on the basis of current structural information regarding these new tests it appeared very likely that both would be chalked up in the successful completion column. The Isabella field was opened by Merrill Drilling Co. late in November 1948, and if both of these new wells are successful, an active development program is predicted for the district.

MICHIGAN SUCCESSFUL WILDCATS

Bay County, Gibson Township: Ervin Major 1 McQuarrie, NW NW NW 1-18n-3e, 50 bbl. from Richfield, TD 4,260 ft. (OWDD from 2,939 ft.)

Gladwin County, Billings Township: Socony-Vacuum Oil Co., Inc., 1 Wolverine Power Co. & Arehart, SW SE SE 2-17n-1e, Dundee 3,435 ft., 20 bbl. after acid, TD 3,558 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Hopkins Township: Del Fortney 1 Brenner & Mroczkowski, NW NW SE 5-3n-12w, Traverse 1,604 ft., dry, TD 1,610 ft.

Valley Township: Ohio Oil Co. 1 Mathews, NE NE NE 6-2n-14w, Traverse 1,369 ft., dry, TD 1,404 ft.

Ohio Oil Co. 1 Root, SE SE SE 23-2n-14w, Traverse 1,357 ft., dry, TD 1,392 ft.

Clinton County: Bengel Township: Michigan Oil Co. 1 Mohnke, NW NE SW 22-7n-3w, Monroe 2,985 ft., dry, TD 3,006 ft.

Gladwin County, Butman Township: H. E. Bell 1 Clayton, SW SE SE 34-20n-1w, Dundee 3,535 ft., dry, TD 3,693 ft.

Kent County, Solon Township: Fisher-McCall Oil & Gas, Inc., 1 Rau, SE SE SE 18-10n-11w, Traverse 2,438 ft., dry, TD 2,456 ft.

St. Clair County, Clay Township: Sun Oil Ct. 1 St. John et al, SE NW NE 36-3n-15e, Niagara 2,282 ft., dry, TD 2,504 ft.

Van Buren County, Lawrence Township: Gannett & Sleep 1 Ampey, SE SW NW 27-3s-15w, Traverse 1,009 ft., dry, TD 1,032 ft.

N. CENTRAL TEXAS

Fisher County Discovery Set for Dual Completion

WICHITA FALLS.—Texas Pacific Coal & Oil Co.'s Fisher County discovery has been scheduled for dual completion, according to reports. The wildcat, in 199-1-H&TC, northeast corner of the county, ran tests on the Swastika, after which it planned to squeeze perforations in that formation in an effort to shut off water, then begin tests on the Ellenburger.

On flowing tests, from perforations at 3,772-80 ft., the well made 287 bbl. of oil and 192 bbl. of water in 20 hours, through ¾-in. choke on top and ½-in. choke on bottom. Flowing pressure was 25 psi. With 16/64-in. choke on top, it gaged 106 bbl. of oil plus 70 bbl. of water in 12 hours, with tubing pressure at 200 psi. Top of the Ellenburger has been placed at 5,950 ft., which logged streaks of saturation to 6,050 ft.

The Roby field, 3½ miles southeast of Roby townsite, Fisher County, had prospects of a third pay discovery and west extension at Lion Oil Co. 1 L. V. Horton, 27-317-El Paso CSL, which was testing the Cook sand. First drill-stem test from 3,589-98 ft. recovered 110 ft. of oil and 6 ft. of oil-cut mud. A second test from 3,594-3,603 ft. yielded 400 ft. of oil plus 50 ft. of oil-cut mud, and a third test from 3,593-3,608 ft. recovered 380 ft. of oil and 40 ft. of oil-cut mud. It was drilling ahead to the Swastika. Production in the field is from the Flippen and Swastika.

Interest continued to mount in the Texas portion of the Anadarko Basin. Gulf Oil Corp. increased its operations to six with the staking of two new wells, one in Hansford and the other in Ochiltree County. The Hansford project is to be the 1 C. Gamertsfelder, 600 ft. from west and 2,432 ft. from north lines, Section 5, Block 4, PSL Survey. Contract depth is 9,500 ft. Location is 6 miles southwest of Gulf's 1 J. R. Collard, 7-3-SA&MG, which was drilling below 5,602 ft. at last report. In Ochiltree County, Gulf's new wildcat is to be the 1-A R. E. Wamble, approximately center of the east half of the J. J. Ballentine Survey. It is scheduled to 12,000 ft. Location is 6 miles west of the company's 1 Harbough, staked last week in 142-13-T&NO. Gulf's other operations are the 1 J. R. Stump, 12-4T-T&NO, Ochiltree County, and the 1 Porter, 413-43-H&TC, in western Lipscomb County, which was last reported drilling below 11,700 ft.

In Clay County, L. T. Burns 1 J. D. Copeland, Block 2636, TE&L Survey, 4 miles west of the Shannon Caddo field, ran a 90-minute drill-stem test from 4,660-75 ft., recovering 30 ft. of oil and gas-cut drilling mud. Drilling continued below 5,030 ft.

Four miles northeast of the Acme field, Akin & Dimock 1 E. B. Nutter, Block 30, H. Devers Survey, was drilling below 5,897 ft. It has had no shows. Same operators' 1 Threadgill, Block 2, J. H. Belcher Survey, wildcat about 2 miles northeast of the Deer Creek field, was drilling in Strawn below 4,655 ft.

Montague County wildcat activity for the week included a small Bend conglomerate discovery, 2 miles south of Belcherville. Tex Harvey Oil Co. 1 Beulah Capps, Block 81, M. Garnett Survey, completed on the pump for 35½ bbl. of oil a day, plus some water. Conglomerate pay from 5,586-5,601 ft. was treated with 2,000 gal. of acid.

Four miles southeast of Stoneburg, The Texas Co. and Continental Oil Co. 1 Lizzie Barker, Block 1, Abstract 421, was drilling ahead below 3,300 ft. It is contracted to 6,500 ft. Seven miles southeast of Montague, Continental's 1 W. C. Williams, J. Belew Survey, had sand with oil odor at 5,799-5,807 ft. and prepared to drill-stem test.

In Wise County, Lone Star Producing Co. 1 Spragins, J. B. Patterson Survey, west offset to the Thrift conglomerate discovery and first confirmation test, was dry at 5,744 ft. A drill-stem test from 5,662-5,744 ft. recovered 30 ft. of mud and no shows.

In Jack County, 1½ miles southwest of the Thrift discovery, Wright, Clark & Senkel 1 Hart-Lewis, Harvey Martin Survey, topped the Caddo at 5,024 ft. and prepared to drill-stem test.

Additional tests have been announced for the new Cherryhomes conglomerate field 5 miles southeast of Jacksboro. Panhandle Producing & Refining Co. staked locations for its 3-A Cherryhomes, 467 ft. from south and 330 ft. from west lines of a lease in the T. Burbridge Survey, east of production in the southwest extension area. Location for its 4-A Cherryhomes was 330 ft. from east and 467 ft. from south lines of a lease in the same survey, and ¼ mile north of production.

South of Jermyn, Cox Drilling Co. 1 Graham estate, J. Irwin Survey, was drilling ahead below 3,110 ft. in shale. Four miles west of Jacksboro, Cox Drilling Co. 1 W. J. Eatherly, 5,000-ft. test, J. McNeal Survey, was drilling in shale at 4,960 ft.

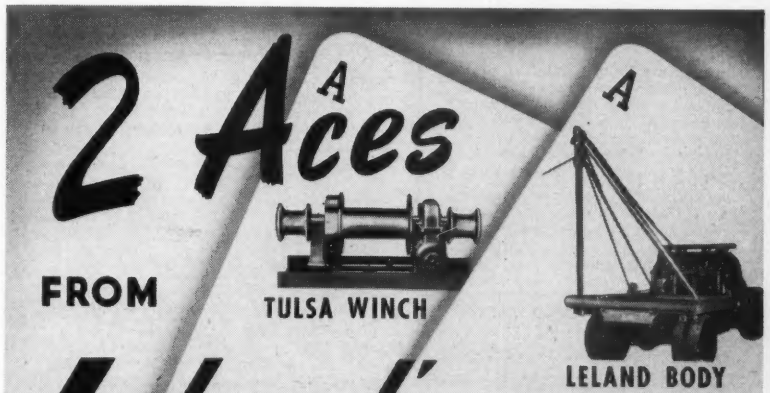
In Wichita County, 3 miles east of Wichita Falls, Wayne H. Hammon was moving in rotary tools to drill 2-B Fassett-Tuttle, a 5,000-ft. test in the southeast part of a 480-acre lease in Block 27, Cherokee CSL. Location is just southwest of the same operators' 1 Thaxton, small producer.

Konrad Sztykgold 1 T. J. Peysen, Lot 42, Block 4, Clark & Plumb Subdivision, 6,000-ft. wildcat 3 miles southwest of Windthorst, Archer County, was drilling shale at 3,978 ft. In the north part of the county, Tom B. Medders 2 Margaret Smith Hancock was rigging up for a 4,750-ft. test. It is 330 ft. from south and 1,728 ft. from west lines, Section 7, Block 1, H&TC Survey.

NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) SUCCESSFUL WILDCATS

Archer County: Featherstone, Spraggins & Riner 1 W. C. Thomas, Blk. 2, N. Thomas Sur., 2 mi. NW Archer City, pumped 72 bbl. 42°-gravity oil a day, GOR 200 cu. ft., sand 3,718-22 ft.

The Texas Co. 1-G T. B. Wilson, H. H.



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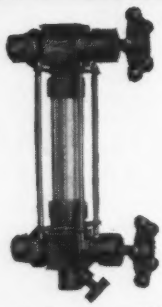

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DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

Kirk Sur., 4 mi. SE Mankins, pumped 61½ bbl. 40°-gravity oil a day, perforated 1,619-23, ft., TD 1,690 ft.

Coleman County: Woods Drilling Co. 1 J. P. McCord, Eliza Yancy Sur. 158, 3 mi. N Glen Cove, flowed 108 bbl. 44°-gravity oil a day, 20/64-in. choke, TP 80 psi., GOR 880 cu. ft., Fry sand 3,300-10 ft., TD, elev. 2,095 ft.

Montague County: Tex Harvey Oil Co. 1 Beulah Capps, Blk. 81, John H. Belcher Sur., 2 mi. S Belcherville, pumped 35½ bbl. 42°-gravity oil a day, some water, conglomerate 5,586-5,601 ft., TD 5,853 ft., top Caddo 5,560 ft.

Throckmorton County: Kriss & Schwarts 2 M. Daws, C. W. Marguess Sur., 12 mi. SW Throckmorton, flowed 480 bbl. 42°-gravity oil a day, ¾-in. choke, CP 300 psi., TP 100 psi., GOR 600 cu. ft., Canyon sand 2,808-18 ft., TD 2,821 ft., elev. 1,299 ft.

E. R. Perkins 1 A. A. Boyd, Sec. 231, BBB&C Sur., 4 mi. NW Throckmorton, flowed 98 bbl. 40°-gravity oil in 5 hr., ¼-in. choke, TP 250 psi., CP 455 psi., pay 3,920-34 ft., TD

NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) WILDCAT FAILURES

Archer County: M. W. Blair 1 W. Duckworth, Blk. 9, J. W. Harris Subd., 9 mi. NE Megargel, dry, TD 1,511 ft.

Clay County: Konrad Sztykgold and H. O. Grace 1 Bobby Burns, J. M. Paxton Sur., 1½ mi. N Shannon, dry, TD 4,862 ft., sand 4,200 ft., no shows.

Comanche County: J. R. Stewart 1 W. J. Anderson, Sec. 32, D&DA Sur., 6 mi. SW Gorman, dry, TD 2,895 ft.

Eastland County: M. H. Crabb 1 H. L. Vestal, Sam Damon Sur., 4 mi. N Pioneer, dry, TD 320 ft.

Jack County: J. J. Lynn 1 Floyd Nash, J. J. Rogers Sur., 10 mi. SW Jacksboro, dry, TD 2,644 ft. in shale.

Jones County: Neeld & Hood Drilling Co. 1 R. D. King, Sec. 157, T&P Sur., 6 mi. NE Avoca, dry, TD 2,024 ft.

Taubert Drilling Co. 1 J. E. Rose, Blk. 272, J. Wall Sur., 3 mi. N Noodle, dry, TD 3,256 ft., sand 1,958-85 ft., coal 2,732-34 ft., lime 3,044-3,256 ft.

Palo Pinto County: Woodley Petroleum Co. 1 Joseph T. Jones, J. Hoffler Sur., 3 mi. S Palo Pinto, dry, TD 4,552 ft., had 350,000 cu. ft. gas at 3,732-49 ft., Ellenburger 4,525 ft., elev. 848 ft.

Shackelford County: J. C. Man and Harvey Oil Co. 1 J. H. Nail, Sec. 122, Blk. 1, T&P Sur., dry, TD 1,725 ft.

Throckmorton County: H. B. Mummert, Jr., 1 W. L. Everett, Sec. 1622, TE&L Sur., 9 mi. S Throckmorton, dry, TD 503 ft.

Wise County: Lone Star Producing Co. 1 C. A. Spragins, J. B. Patterson Sur., 6 mi. W Chico, dry, TD 5,744 ft., Caddo 5,125 ft., gas estimated 750,000 cu. ft.

Young County: Archer Drilling Co. 1 J. R. Barnett, Sec. 186, TE&L Sur., 3 mi. W Olney, dry, TD 1,190 ft.

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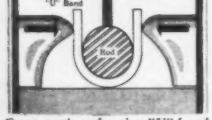

Cross section showing "U" band being die-formed around rod to within a fraction of an inch of scraper blades.

Cross section showing band held under pressure around rod while ends of band are shrink-grip attached to scraper blade.

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OHIO, KENTUCKY

Benedum-Trees Test Hits St. Peter Gas

COLUMBUS.—Benedum-Trees reached the St. Peter at 5,690 ft. in their wildcat on Meri Eichenberg, Lot 20, Mayfield Township, Cuyahoga County, and at 5,692 ft. showed 129,000 cu. ft. of gas. The gas blew down to 38,000 cu. ft. and drilling is being continued.

Wasson & Co.'s wildcat on C. H. Hunt, Lot 33, Washington Township, Tuscarawas County, found 4 ft. of Oriskany sand at 3,314-18 ft. with a gage of 213,000 cu. ft. of gas which will be shot and tested before tubing. The gas found in the Berea sand will be produced through the casing.

Allen Willey et al 1 John Lewis, Lot 6, Jackson Township, Muskingum County, after producing natural for some time, was shot and made 302 bbl. of oil in the first 24 hours. Leasing and drilling activity is very active in this area now.

Four Way Oil & Gas Co. 4 May Walser, Section 27, Hopewell Township, Perry County, is showing for a good producer. The Clinton at 2,896-2,934 ft. made 65 bbl. of oil natural, which will be shot before completing.

In the Perryton pool, the Mid East 1 Z. W. Brown, Section 1, gaged 330,000 cu. ft. of gas with a show of oil, and 3,142,000 cu. ft. of gas ½ hour after shot, along with 25 bbl. of oil in 24 hours. John Morrow et al moved a mile south of the pool for a test on F. R. Burnside in Lot 7.

OHIO SUCCESSFUL WILDCAT

Muskingum County, Highland Township: Chartiers Oil Co. 1 J. T. Leach, Sec. 20, Clinton 4,520-68 ft., 5 bbl. of oil, TD 4,660 ft.

OHIO WILDCAT FAILURES

Noble County, Buffalo Township: Ralph Helverson et al 1 Ava Brick Co., Sec. 31, Oriskany 3,728-38 ft., TD 3,749 ft.

Wayne County, Wooster Township: Ohio Fuel Gas Co. 1 Frank Taggert, Sec. 2, Clinton 3,331-87 ft., TD 3,459 ft.

EASTERN KENTUCKY

ASHLAND.—In Elliott County, 15-S-77, Hobe Fannin et al 1 Walt Kazee topped Corniferous lime at 1,563 ft. with shows of oil and some water. Operators then drilled on to Big Six formation, topping same at 1,834 ft., and found it dry to 1,884 ft. Total depth of hole is now 1,896 ft. and operators are considering plugging back and acidizing oil show in upper Corniferous.

In Breathitt County, 1-N-75, Diederich & Ware are drilling below 1,100 ft. on 1 Boone Coal & Timber. The well is designed to test the Big Six horizon, a formation which has been getting a lot of attention lately due to the recent discoveries of gas in that series of rock further northeast in Magoffin County.

EASTERN KENTUCKY WILDCAT FAILURE

Johnson County: Crate Rice et al 1 O. P. Williams, 3-Q-80, dry, TD 2,225 ft., Big lime 415 ft., Berea 875 ft., Corniferous 1,565 ft., Big Six 2,175 ft.

WESTERN KENTUCKY

OWENSBORO.—Great Lakes Carbon Co. has another good completion in the Pellville area of Daviess County. The well, 3-M Head, SE NW NW 25-P-33, was completed in the McClosky at 998-1,008 ft. with an initial production of 160 bbl. per day without acid treatment. Total depth is 1,008 ft.

The northern part of Griffiths pool in Daviess County had five Palestine completions for the week. This area has been very active since the extension well was completed last December. Initial production of last week's wells ranged from 20 bbl. to 67 bbl. daily.

Miller & Shiarella and Ashland Oil & Refining Co. completed another Jackson sand well in the Guffie area. The well, 6 Wright Brothers, 20-N-27, made an estimated 25 bbl. per day from pay at 1,893-1,905 ft.

On the south side of the recently opened North Euterpe pool in Henderson County, Ashland Oil & Refining Co. and Basin Drilling Co. have completed 4 C. M. Crafton, NW NE NE 10-O-25. The well made 36 bbl. per day from the Hardinsburg at 1,715-30 ft.

Todd County is getting another wildcat test as O. R. Sellers rigs up cable tools at 1 J. C. Hightower, about 8 miles north of the town of Elkton.

The deep Webster County test, Pure Oil Co. et al 1 M. L. Walker, SE SE NW 22-N-24, has been abandoned as a dry hole. The Devonian was called at 3,205 ft., Silurian at 4,000 ft., Trenton at 4,740 ft., St. Peter at 5,520 ft., and Knox at 5,975 ft.

WESTERN KENTUCKY WILDCAT FAILURE

Webster County: Pure Oil Co. et al 1 M. L. Walker, SE SE NW 22-N-24, dry, TD 6,686 ft.

INDIANA

EVANSVILLE.—North Owensville pool in Gibson County has three tests that are showing for possible extensions to the pool. On the east side of the pool, Pacific Operating Co. has set casing at 1 Lucas, SW SE NE 19-2s-11w, for tests of the O'Hara. A 1-hour drill-stem test at 2,232-46 ft. had a recovery of 1,500 ft. of gas and 240 ft. of oil and mud-cut oil. Casing was set at 2,297 ft. and total depth is 2,307 ft.

Southeast of the Lucas well and about ½ mile east of production, W. A. Schuler 1 John Sprinkle, SW SW SW 20-2s-11w, is going on pump for tests of the McClosky at 2,332-38 ft. Pay was treated with 3,000 gal. of acid and swabbed at the rate of 7 bbl. per hour.

To the south of the pool, G. W. Evans is testing the Cypress at 1 Nancy Marvel, NE NW NW 31-2s-11w. The well is reported to be swabbing 5 bbl. of oil per hour from pay at 2,016-27 ft.

In Posey County, W. E. Witt and L. L. Blomgren 1 Walter Whitehead, NE SW NW 3-7s-12w, is going on pump to test the McClosky at 2,708-12 ft. after averaging 9 bbl. per hour for 24 hours, pumping on beam. The well is about 2 miles west of Huesler pool and about 7 miles west of Evansville.

Leonard Deay had two good Devonian completions in Vigo County for the week. Deay 1 Lee and Clingermann, SW SE NE 23-11n-8w, in the old Riley pool, had an initial production of 50 bbl. per day from pay at 1,640-44 ft. Deay 1 Brown, SE SW NE 32-10n-10w, Siosi pool, was completed in the Devonian at 2,256-63 ft. for 100 bbl. per day.

INDIANA WILDCAT FAILURES

Crawford County: Sun Oil Co. 1 E. E. Eaton, SE NW SE 27-3s-1w, dry, TD 1,984 ft.

Gibson County: Ashland Oil & Refining Co. and C. Miles 1 H. J. Taylor, SE SW SE 17-2s-10w, dry, TD 2,220 ft.

Sullivan County: H. A. Siepman Oil Co. 1 Pierson, SW SE SW 13-9n-8w, dry, TD 2,051 ft.

Vanderburgh County: Tide Water Associated Oil Co. 1 J. M. Bower, SW SW SW 32-5s-11w, dry, TD 2,697 ft.

Washington County: A. Weston 1 M. Howell, SE SE SE 11-2n-4e, dry, TD 908 ft.

APPALACHIAN FIELD

Jackson County Well To Shoot Newburg Sand

PITTSBURGH.—In Ripley district, Jackson County, West Virginia, South Penn Oil Co. 1 N. S. King, elevation 768 ft., stopped drilling at a depth of 6,283 ft. through the Clinton sand which was logged at 6,099-6,177 ft. and dry. It will be plugged back and shot in the Newburg sand which was at 5,423-5,432 ft.

In Portland district, Preston County, William E. Snee et al 3 Sisler, elevation 2,036 ft., which started drilling deeper at 5,622 ft., topped the Oriskany sand at 5,704 ft., gas at 5,792-94 ft., testing 2,000,000 cu. ft. of gas. Drilling is at 5,795 ft.

In Harvey district, Mingo County, United Fuel Gas Co. 4-6377 fee, gaged 8,247,000 cu. ft. of gas natural in the Big lime, total depth 2,100 ft., and the company's 34-6449 Henry Closterman gaged 1,264,000 cu. ft. of gas in the Salt sand, total depth 1,345 ft.

In Grant district, Wayne County, United

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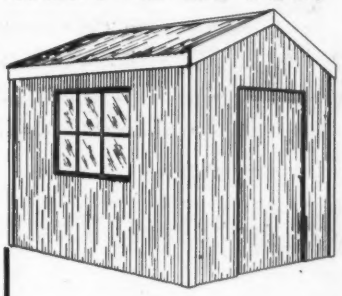

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Fuel's 1-6499 fee gaged 1,043,000 cu. ft. of gas in the Brown shale, total depth 3,412 ft.

New locations reported in West Virginia were nine: Ravenwood district, Jackson County; Collins Settlement district, Lewis County; Harts Creek district, Lincoln County; Trap Hill district, Raleigh County; Union district, Wayne County; Baileysville and Oceana districts, Wyoming County.

In Napier Township, Bedford County, Pennsylvania, South Penn et al, Snee & Eberly 1 Jesse B. Miller, elevation 1,666 ft., encountered a fishing job at 3,119 ft.

In Elder Township, Cambria County, Peoples Natural Gas Co. 3831 Clearfield & Bituminous Coal Co., elevation 2,010 ft., is drilling at a depth of 5,262 ft.

In Unity Township, Westmoreland County, Peoples Natural Gas Co. 3830 William Piper, elevation 2,061 ft., is drilling at 7,788 ft.

New locations reported in Pennsylvania were four: Porter Township, Clarion County; Cumberland Township, Greene County; Nottingham Township, Washington County; Allegheny Township, Westmoreland County.

CANADIAN FIELDS

Alberta Discovery Flows 528 Bbl.

CALGARY.—Alberta's most recent discovery has been placed on production with an indicated initial potential of 528 bbl. daily on a 3-hour test through ½-in. choke. The well, Superior-Joseph Lake 1, located in LSD 11, 22-50-22w4, is 22 miles due east of the Leduc oil field and 18 miles southeast of Edmonton. This Viking sand discovery well has pay zone of about 7 ft., at 3,264-71 ft., opened by jet-perforating at 3,264-65 ft., with 3 shots. Previously the same 1-ft. interval had been perforated with 171 ordinary shots, which failed to open the oil zone.

On the first flow run, through ½-in. choke, the well produced 65 bbl. in 3 hours, or a rate of 528 bbl. daily. Gas-oil ratio was 590 cu. ft. per bbl. Casing pressure was 500 psi., tubing pressure 110 psi., and separator pressure 50 psi. On a later 4-hour test, through ⅞-in. diameter choke, the well flowed 11.7 bbl. per hour, or 281 bbl. daily. On this run, gas-oil ratio was 1,000 cu. ft. per bbl. At last report, the well was shut in for bottom-hole pressure test, and will be reopened for extended flow tests in the immediate future.

Interest in the Joseph Lake well and in 8,960 acres surrounding it, is divided 50 per cent to Imperial Oil, 15 per cent to General Petroleums, 12½ per cent to Superior Oils and Kroy Oils, and 10 per cent to Jupiter Oils.

Golden Spike.—Imperial-Schoepp 1, discovery well southwest of Edmonton, is continuing to find productive porosity in the D3 Devonian coral reef. Latest drill-stem test at bottom 5,735 ft. brought a flow of oil to the surface in a short but unspecified time, and gave a fluid recovery when pipe was pulled of 2,045 ft. of oil, no sign of water, thus recording a total known thickness of D3 productive zone of 373 ft. This is an increase of 113 ft. of oil pay during the past 7 days. Crew has cored an additional 20 ft. to 5,755 ft., and are now running further drill-stem test.

Bon Accord.—Imperial-Bon Accord 1, D2 Devonian indicated oil discovery, in LSD 1, 29-56-23w4, about 18 miles north of Edmonton and 12 miles southwest of the main section of the Redwater oil field, has finally halted drilling. The well drilled to 4,630 ft., found water in the D3 zone, plugged back to D2 and set casing at 3,650 ft. Casing was perforated opposite the D2 oil pay at 3,585-3,608 ft. Test of this section previously brought a flow of 35°-gravity oil to the surface 19 minutes after tester was opened, with no sign of water. A test immediately below showed water. The well drilled on to D3 and showed water, no oil, so has plugged back for production tests of the D2 Devonian. At last report, the Bon Accord was being swabbed in attempt to place it on production.

Lac la Biche.—Central Lac la Biche 1 wildcat encountered natural gas in the Viking sand at 780 ft., drilled on to the Devonian and discovered gas in that formation at 1,585 ft. The venture, however, was linked with tragedy, as the well was a discovery and also on fire at practically the same moment. Central Leduc's well is now under control, but Stanolind Oil & Gas' Lac la Biche Viking sand gas discovery is still blowing wild while a relief well, some 200 ft. east, is whipstocking at around 450 ft. It is hoped to kill Stanolind's well by water flooding through the directionally-drilled relief hole.

The Lac la Biche area, 110 miles northeast of Edmonton, now has indicated gas reserves of importance in the virgin territory, but delays in developing them and also in determining possibilities of crude production lower in the Devonian have withheld their potentialities. Possibly a week will lapse before the Central venture will commence drilling operations again, and the Stanolind well will likely have to be abandoned when it is finally killed.

Perryvale.—Stanolind-Perryvale 1, LSD 14, 11-63-23w4, is being abandoned after failing to show oil or gas in the McMurray sand horizon. A 2-hour drill-stem test from 2,494-2,585 ft. gave a pipe recovery of 65 ft. of drilling mud. The well was drilled to total depth of 4,043 ft. and then plugged back to 2,570 ft. for test of the McMurray section. Site of the Perryvale venture is about 55 miles north of Edmonton.

Redwater.—Imperial Redwater 7 has been placed on steady production from the D3 zone of Devonian at 3,217 ft. with an initial potential of 1,719 bbl. daily. Location is in LSD 11, 28-57-21w4. Imperial Redwater 8, LSD 3, 32-57-21w4, completed at 3,199 ft., rates an initial potential of 1,833 bbl. daily.

Priddis.—Royalite Oil Co.'s Priddis 1, wildcat south of Calgary, has been abandoned at a total depth of 10,199 ft. after failing to find commercial production. Location is in LSD 13, 30-22-3w5. The well was carried through to the Madison limestone.

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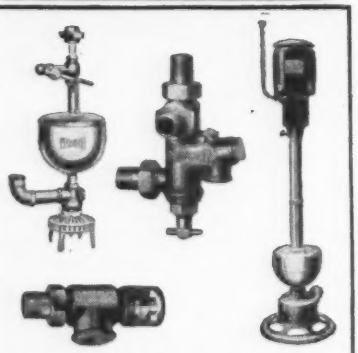

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KANSAS

North Berland Discovery Rates 3,000-Bbl. Potential

BIRMINGHAM & BARTLETT 1 Marcotte, SE SW NW 18-10-19, discovery well of the North Berland pool, 1½ miles north of the Berland pool, Rooks County, has been given a maximum drawdown potential rating of 3,000 bbl. per day from the Arbuckle lime topped at 3,765 ft. (1,532 ft. subsea depth). Hole was drilled to 3,770 ft. Good showings also were encountered in the Kansas City-Lansing, topped at 3,466 ft., from which 3,383 ft. of oil was recovered in a 10-minute drill-stem test at 3,493-3,526 ft.

A south offset to the discovery well has been started by Skelly Oil Co. at 1 Scoggins, NE NW SW 18-10-19. The latter company also has made location for 1 Sistor, NE NE SW 13-10-20, ¾ mile east of the discovery.

Alpine Oil & Royalty Co. 1-B Bryant, NE NE SE 27-20-12, ½ mile southeast of the Bryant pool, Barton County, has been rated at 694 bbl. per day from the Arbuckle lime with total depth at 3,385 ft. Top of the Arbuckle is 3,375 ft. (minus 1,544 ft.) with 5-in. casing at 3,376 ft.

Three-quarters of a mile farther southeast, and a mile south of the West Marchand pool, W. H. Black and Gough Davis 1 Panning, SW SW SE 26-20-12, swabbed at the rate of 12 bbl. an hour from the Arbuckle following a 1,000-gal. acid treatment. Top of the Arbuckle at 3,369 ft. (minus 1,529 ft.) is 5 ft. lower than in the Alpine well. Total depth is 3,376 ft.

E. H. Adair 3 Lanterman, NW NW SW 35-20-12, ¾ mile southwest of the Panning discovery and a half mile east of the Southeast Workman pool, looks like a third new Arbuckle discovery in the triangular area marked by the Bryant, West Marchand and Southeast Workman pools. Topping the pay at 3,403 ft. (minus 1,559 ft.) and drilled to 3,403 ft., it is swabbing at the rate of 2 bbl. per hour following treatment with 2,000 gal. of acid.

The same operator's 1 McCullough, SE SE NW 32-25-4e, a mile north of the discovery well of Towanda pool, Butler County, filled up and started to flow 39° oil after drilling to 2,655 ft. in the Viola lime, topped at 2,645 ft. (minus 1,325 ft.) Seven-inch casing was run to 2,655 ft. and testing is under way. Discovery well, drilled by Adair and Rex & Morris, was completed last April with the Viola topped at 2,566 ft., 59 ft. higher than in the present well. It flowed 50 bbl. per day.

R. S. Shade and R. G. Berry 2 Henderson, NE SE SW 15-11-18w, Southwest Burnett pool, Ellis County, flowed at the rate of 23 bbl. per hour on a physical production test from the Kansas City-Lansing lime with casing perforated at 3,360-70 ft.

Carter Oil Co. is starting an interesting wildcat in Wabaunsee County in the northeastern part of the state. The test, 1 G. H. Davis, SW SE SW 33-13-10, 10 miles east of the Alta Vista gas pool, is at the southern end of the Forest City basin. It will be drilled to the Arbuckle. Location was made on the basis of surface geology.

KANSAS WILDCAT FAILURES

Barber County: White Eagle Oil Co. 1 Newton, NW NW NE 21-32s-13w, dry, TD 5,075 ft., Lansing 3,970 ft., Mississippian 4,462 ft., chat 4,791 ft., Misener 4,796 ft., Viola 4,799 ft., Simpson shale 4,922 ft., Simpson dolomite 4,936 ft., Simpson sand 4,958 ft., Arbuckle 5,021 ft.

Barton County: Central Oil Co. 1 Nagel, SE SE NW 29-17s-11w, dry, TD 3,405 ft., Topeka 2,693 ft., Heebner 2,935 ft.,

basal Oread 2,963 ft., lime 3,041 ft., Kansas City 3,058 ft., conglomerate 3,320 ft., Arbuckle 3,390 ft.

Bennett & Roberts Drilling and Wilcox Oil Co. 1 Tucker, NE NE SW 34-20s-13w, dry, TD 3,637 ft., lime 3,250 ft., Lansing 3,260 ft., sandy conglomerate 3,521 ft., conglomerate 3,498 ft., weathered Arbuckle 3,587 ft., Arbuckle 3,599 ft.

Ford County: Francis Oil & Gas Co. 1 Wiseman, C S/2 NE SW 5-26s-24w, dry, TD 4,380 ft., Stone Corral 1,629 ft., Hollenberg 2,583 ft., Howard 3,744 ft., Topeka 3,829 ft., Kansas City 4,269 ft.

Stafford County: M. B. Armer 1 Asher, SW SW NW 17-21s-14w, dry, TD 3,775 ft., anhydrite 882 ft., Heebner 3,257 ft., lime 3,367 ft., Lansing 3,381 ft., conglomerate 3,629 ft., Viola 3,645 ft., Simpson 3,674 ft., Arbuckle 3,723 ft.

CALIFORNIA

Barnsdall Gets Discovery In Guijarral Hills Field

LOS ANGELES.—A new pool discovery has been made in the Guijarral Hills field of Fresno County by Barnsdall Oil Co. above the presently productive Leda sand. The company's 2 Allison in 34-20s-16e topped the new pay at 8,160 ft., and on a subsequent formation test of the interval 8,164-8,200 ft., with tester open 24 minutes, gaged a flow at the rate of 1,000 bbl. a day of 37°-gravity clean oil. The new producer is bottomed in the Temblor formation of Miocene age and the pool will be designated the Allison pool.

The Guijarral Hills field was one of the major oil field discoveries of 1948 in California. The first well, 1 Fred Smith, Section 34-20s-16e, was brought in last September by Barnsdall. Its initial production of 450 bbl. a day of 37.8°-gravity clean oil through a 11/64-in. choke pointed to the importance of the discovery. The source of the oil was recognized as the Leda formation of Oligocene age. This producing interval runs from about 8,650 ft. to 8,740 ft. Below the Leda, and yet to be tested in this field, is the Gatchell sand equivalent. The Gatchell is productive in the Coalinga Nose field immediately to the northwest. Ten wells have been completed in the Guijarral Hills field to date by three operators: Barnsdall, Standard of California, and R. S. Lytle.

Recent successful completions in the DeSoto pool in the Long Beach field, Los Angeles County, deepest pool in that field, have stimulated drilling to that horizon, although until recently little interest has been shown in its potentialities even though its existence has been known for 10 years. Last December, R. W. Jerman, Inc., drilled a well to the DeSoto which came in for 440 bbl. a day of 29°-gravity oil through a ⅜-in. choke. It was the best producer ever completed in this pool, and based on the geology worked out in this well several good wells have since been brought in, the latest being Hancock Oil Co.'s 34 Signal which was completed last week flowing 380 bbl. daily through a 24/64-in. choke. The hot spot is the vicinity of 32nd Street and Pasadena Avenue along the Cherry Hill fault. Latest reports are that Max Pray, Long Beach operator, and Fred Morgan, Oklahoma drilling contractor, have acquired the A. S. Johnston Drilling Co. lease and are preparing to drill the first of 17 wells to the DeSoto. Hancock is preparing to drill a second well to the DeSoto, and Herley-Kelley has made a location.

Richfield Oil Corp.'s 1 Perkins wildcat at the southeast end of the Cuyama Valley is scheduled to undergo tests this week following the setting of casing at 10,788 ft. Total depth of this well, which lies in 27-10n-26w, 10 miles southeast of the big Russell Ranch field, is 11,836 ft. Richfield has further indicated its interest in this part of the valley by staking location for a new test, to be known as the 1 Homan, 5 miles southeast of the Russell Ranch field in 35-10n-27w. Humble Oil & Refining Co.'s 1 E. N. Wegis et al, the farthest southeast wildcat in the valley, Section 28-9n-25w, has been abandoned at 2,501 ft.

Shell Oil Co.'s 1 James, a Cretaceous test in 1-19n-5w, near Willows in Glenn County, is drilling below 8,900 ft. and is believed to be a few hundred feet short of its objective. California operators have tried for years to find oil in substantial quantities in the Cretaceous and each new attempt attracts interest. At present, oil is obtained from the Cretaceous only in the very small Oil City field at Coalinga, although natural gas is found in the Cretaceous at several points in the upper Sacramento Valley.

Standard of California has not yet been successful in completing its Kettleman Hills South Dome Eocene discovery, the 4-2 San Francisco & Fresno Land Co., 12-25s-19e, Kern County. After finding the pay a month ago below 12,000 ft., the well went to water after flowing high gravity oil for about 24 hours.

CALIFORNIA SUCCESSFUL WILDCATS

Kern County, Tejon Hills area: Tejon Hills Co. 13 Tejon Hills, 11-11n-18w, pumped 40 bbl. daily, gravity 28°, cut 0.1 per cent, gas 200,000 cu. ft., elev. 1,005 ft., TD 665 ft.

Solano County, Suisun Bay area: Standard Oil Co. of California 2 Honker Community, 30-3n-1e, flowed 868,000 cu. ft. of gas through ⅛-in. choke, and 2,304,000 cu. ft. through ¼-in. choke. elev. 20 ft., TD 7,008 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Mount Poso area: Bradford Bishop 14-1 Martin, 14-28s-28e, dry, elev. 1,205 ft., TD 977 ft.

Blackwells Corner area: British-American Oil Producing Co. B-1 Beer, 8-26s-19e, dry, elev. unknown, TD 718 ft.

McDonald Anticline area: Independent

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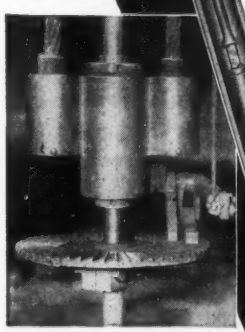

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Edison area: Fred Manning 1 DiGiorgio, 36-30s-29e, dry, elev. 605 ft., TD 1,456 ft. in granite.

Tejon Hills area: Steele Petroleum Co. 1 Anniversary, 10-11n-18w, dry, elev. 1,109 ft., TD 640 ft.

Santa Barbara County, Cuyama Valley area: Gene Reid Exploration Co. 82 Hinsdale, 18-10n-27w, dry, elev. unknown, TD 5,025 ft.

Ventura County, North Montalvo area: The Superior Oil Co. 1 Limoneira, 9-2n-22w, dry, elev. unknown, TD 18,734 ft. (world's deepest well).

Montalvo area: Standard Oil Co. of California 39-1 Hearst, 24-2n-23w, dry, elev. 51 ft., TD 10,180 ft.

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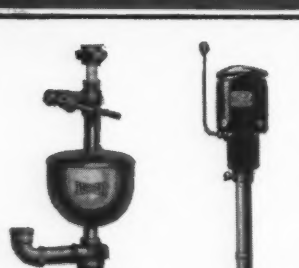

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Los Angeles County, Newhall area: Universal Consolidated Oil Co. 1 Phillips, 2-3n-16w, dry, elev. 1,260 ft., TD 5,264 ft.

OKLAHOMA

Old Grant County Pools Get Good Wells in New Play

NEW development started several months ago in the old Webb pool, Grant County, paid off again the past week with the completion of two more good wells. Continental Oil Co. 6 Franz, SE NE SE 35-28n-3w, drilled to 4,342 ft. in the Wilcox, topped at 4,329 ft., kicked off after swab was run once, and flowed 551 bbl. of clean oil in 4 hours through 1-in. before being shut in for additional storage. Later, with choke reduced to ⅛ in., it flowed 70 bbl. on a 24-hour test. Champlin Refining Co. 2-B Forsyth, SW SW SW 36-28n-3w, a quarter mile southeast, flowed 170 bbl. of oil in 24 hours through 17/64-in. choke from the same sand topped at 4,279 ft. and bottomed at 4,316 ft. Continental has made two additional locations, one for 7 Franz, NE SE SE 35-28n-3w, and the other for 2 School Land, SE SE NW 36-28n-3w.

British-American Oil Co. 2 Balderson, SW NW NE 24-28n-3w, North Webb pool, where new activity also is under way, swabbed at the rate of 3½ bbl. an hour after plugging back to 4,382 ft. with open hole below the 7-in. casing at 4,336 ft. The same company's 3-A Corneil, SW NE NW 24-28n-3w, flowed 119 bbl. in 24 hours through ¼-in. choke from and at 4,681-4,692 ft.

In the recently opened Rich Valley pool, same county, Carter Oil Co. 1 Moore-Daniel, SW SE SE 36-26n-5w, flowed oil and gas on a 75-minute drill-stem test at 5,817-41 ft. Gas showed in 4 minutes and oil in 65 minutes. Oil flow was estimated at the rate of about 10 bbl. per hour and gas at 250,000 cu. ft. per day. The same company's 1 Kirby, SW NW NW 6-25n-4w, southeast offset to the discovery well, recovered 1,260 ft. of salt water on a drill-stem test at 5,858-5,900 ft. and has been abandoned.

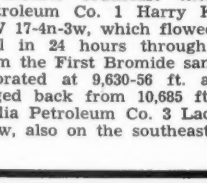
Shell Oil Co., Inc., 1 Kelly, C NE SW 23-10n-21w, 1 mile south of the discovery well of the Elk City field, Beckham County, flowed 1,106 bbl. of clean oil on a 20-hour production test with casing perforations at 10,110-90 ft. During the first 12 hours, flow was through ⅞-in. bottom hole choke and 1-in. top choke. Flow the last 8 hours was with the same bottom choke but with top choke reduced to 24/64-in. On a previous production test of the same zone but with perforations at 10,130-80 ft., the well flowed only 130 bbl. in 6 hours through ⅝-in. choke. Retesting the present zone follows more or less disappointing tests in an upper zone at 9,610-40 ft.

Continental Oil Co. and Ashland Oil & Refining Co. 2 Capers, C E½ NW SW NW 24-23n-1w, northeast end of the "shoestring" South Ceres pool, Noble County, flowed 126 bbl. in a 24-hour test through 15/64-in. choke. Production is from the Burbank sand with open hole at 4,400-50 ft. On the south end of the same pool, H. H. Wegener 1 McLimans, SE SE NE 8-22n-1w, flowed 200 bbl. of oil and 39 bbl. of water through ¼-in. choke after plugging back to 4,650 ft. with casing at 4,610 ft.

Magnolia Petroleum Co. 2 Seeley, NW NE NE 24-5s-1w, east side of West Brock pool, Carter County, is showing for a good producer although offsetting a recent dry hole. On a 12-minute drill-stem test at 4,181-92 ft. it showed gas in 3 minutes and oil in 11 minutes. Flow was estimated at the rate of 8 to 10 bbl. of oil per hour and 300,000 cu. ft. of gas per day through ⅝-in. choke. Shut-in pressure was 1,650 psi. Seven-in. casing has been set and cemented at 4,183 ft. for production tests.

Continental Oil Co. 1 Dunbar, SW SW SW 5-4s-2w, east offset to the same company's discovery well of the Northwest Hewitt pool, Carter County, recovered 360 ft. of oil-cut mud, 70 per cent 37° oil, in a 60-minute drill-stem test of the Deese sand at 2,872-2,913 ft. Bottom hole pressure was 900 psi.

The East Lindsay field, Garvin County, received another southeast extension at Sohio Petroleum Co. 1 Harry K. Moore, C NW NW 17-4n-3w, which flowed 635 bbl. of 42° oil in 24 hours through 20/64-in. choke from the First Bromide sand. Casing was perforated at 9,630-56 ft. after hole was plugged back from 10,685 ft. to 9,673 ft. Magnolia Petroleum Co. 3 Lacy, C NW NE 5-4n-3w, also on the southeast flank of



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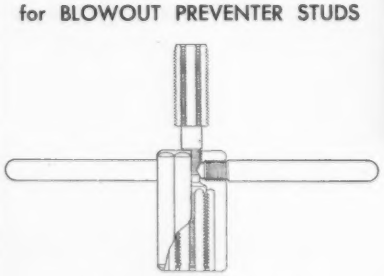

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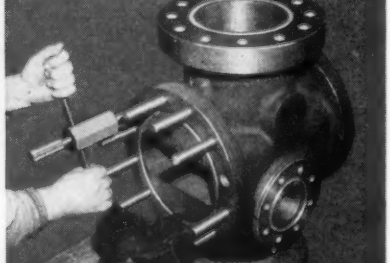
BAIRD MFG. CO.—TULSA



the East Lindsay field, flowed 84 bbl. of 40° oil through ¼-in. choke from perforations at 7,690-94 ft. after plugged back to 7,703 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Major County: Extension to Ringwood-Mazda 1 Harris, NE NW NE 33-22n-10w, flowed 126 bbl. of oil in 13 hours, through ¾-in. tubing choke, from Manning at 6,755-6,835 ft., TD.

Osage County: Peters 1 Osage, NE NE SE 35-20n-11e, pumped 4 bbl. of oil per day from Hominy at 2,240-69 ft., TD 2,371 ft.

Pontotoc County: Rinehart 1 Mayhue, SE SE NW 27-4n-6e, pumped 15 bbl. of 30°-gravity oil per day from sand at 1,160-64 ft., TD 2,310 ft.

OKLAHOMA WILDCAT FAILURES

Cotton County: Texana 1-A Baskett, NW SE SE 7-3s-10w, dry, TD 895 ft., no tops reported.

Hutcheson 1 Adams, NE SE SE 29-3s-12w, dry, TD 1,855 ft., sand 755-867 ft. and 1,283-1,300 ft., granite wash 1,520-38 ft., sand 1,630-55 ft. and 1,744-65 ft. with a show of gas.

Grimes 1 Estep, NW NW NE 12-5s-11w, dry, TD 2,002 ft., hard sand 1,058 ft., sand 1,141-54 ft. and 1,190-1,205 ft., hard dolomite 1,482-87 ft., sand 1,487-1,500 ft., lime and dolomite 1,500-15 ft., limy sand 1,644-50 ft. and 1,653-77 ft., hard sand 1,687-93 ft., lime 1,693-1,703 ft., sand 1,738-48 ft., lime 1,771-90 ft. and 1,848-64 ft., shale 1,864-2,002 ft.

Farris 1 Jordon, SW SW SE 14-5s-13w, dry, TD 2,022 ft., sand 1,093-1,100 ft., granite was 1,100-05 ft., sand 1,445-65 ft. and 1,505-15 ft., fusilinid 1,683-85 ft., sand 1,804-31 ft., hard limy sand 1,841-64 ft., lime 1,875-78 ft., shale 1,978-2,002 ft.

Grady County: Duke 1 Wyatt, NE NE SW 8-5n-7w, dry, TD 1,954 ft., no tops reported.

Greer County: Lawless 1 Sappington, SE SW NW 10-6n-21w, dry, TD 650 ft.

Kay County: Chadwell et al 1 Stewart, NE NE SW 15-29n-4e, dry, TD 3,702 ft., Tonkawa 2,125 ft., Layton 2,390 ft., Checkerboard 2,690 ft., Big lime-Oswego 2,875 ft., Mississippi lime 3,210 ft., Simpson 3,624 ft., Arbuckle 3,657 ft.

Wilcox 1 McKee, SE SW NW 20-28n-1w, dry, TD 3,721 ft., Tonkawa 2,385 ft., Layton 2,806 ft., Oswego 3,218 ft., Woodford 3,450 ft., Wilcox 3,480 ft., Tyner 3,538 ft., Arbuckle 3,644 ft.

Mead Foundation 1 Bradock, NE NW SE 23-29n-1w, dry, TD 3,741 ft., Oread 2,062 ft., Lovell 2,175 ft., Tonkawa 2,480 ft., Layton 2,840 ft., Checkerboard 3,135 ft., Big lime 3,205 ft., Mississippi chat 3,415 ft., Mississippi lime 3,440 ft., Woodford 3,592 ft., Wilcox 3,642 ft., Arbuckle 3,723 ft.

Lincoln County: Waggoner Estate 1 School Land, SW SW SE 36-14n-5e, dry, TD 4,690 ft., Hogshooter 2,167 ft., conglomerate 2,570 ft., Oswego 3,430 ft., Prue 3,469 ft., Prue sand 3,488-3,515 ft., Verdigris 3,515 ft., Skinner 3,599-3,620 ft., Inola 3,895 ft., Bartlesville 3,905 ft., lime 4,060 ft., Mayes 4,395 ft., Woodford 4,645 ft., Hunton 4,675 ft.

Jordan 1 Eyestone, NW SW SE 12-15n-3e, dry, TD 5,016 ft., Hogshooter 2,940 ft., Checkerboard 3,252 ft., Oswega 3,860 ft., Prue 3,916 ft., lime 4,136 ft., Red Fork 4,220 ft., lime 4,430 ft., Mississippi lime 4,499 ft., Woodford 4,670 ft., Hunton 4,718 ft., Sylvan 4,760 ft., Viola 4,853 ft., Wilcox 4,923 ft., second Wilcox 4,980 ft.

Logan County: Eason 1 Gooch, SE SE NE 18-17n-2w, dry, TD 6,030 ft., Pawhuska 2,407 ft., Deer Creek 2,601 ft., Oread 3,289 ft., Tonkawa sand 3,633 ft., Avant 3,854 ft., Dewey 3,936 ft., Hogshooter 4,581 ft., Checkerboard 4,730 ft., Big lime 5,039 ft., Oswego 5,148 ft., Mississippi lime 5,402 ft., Woodford 5,565 ft., Hunton 5,613 ft., Sylvan 5,633 ft., Viola 5,726 ft., dense 5,750 ft., dolomite 5,847 ft., Wilcox 5,892 ft., second Wilcox 5,983 ft.

Payne County: Kingery Brothers 1 Kerby, SE NW SE 19-19n-5e, dry, TD 3,835 ft., Osage-Layton 2,040 ft., Hogshooter 2,360 ft., Checkerboard 2,722 ft., Peru 3,035 ft., Big lime 3,054 ft., Oswego 3,118 ft., Cherokee 3,153 ft., Prue 3,185 ft., Skinner 3,345 ft., lime 3,388 ft., Red Fork 3,405 ft., no Bartlesville, lime 3,580 ft., Mississippi lime 3,667 ft., Woodford 3,763 ft., Misener 3,798 ft., Viola 3,828 ft.

Seminole County: Crosbie 1 Livingston, SE SE NW 36-11n-7e, dry, TD 4,316 ft., Checkerboard 1,518 ft., lime 3,345 ft., Booch 3,462 ft., Gilcrease 3,590 ft., Union Valley 3,684 ft., Cromwell 3,696 ft., Mayes 4,075 ft., Woodford 4,192 ft., Hunton 4,224 ft., Sylvan 4,300 ft.

Stephens County: Davon 1 Aldridge, SW NE SE 15-1s-4w, dry, TD 6,005 ft., Simpson sand 5,680 ft., no shows (geological wildcat).

ILLINOIS

Burnt Prairie Extension Test Shows Oil

MATTOON.—Magnolia Petroleum Co. has a possible extension to the west side of Burnt Prairie pool in White County at 1 L. E. Jones, SW NW SE 30-3s-9e. Operator has set casing for test of the McClosky following a 1-hour drill-stem test at 3,474-85 ft. that had gas in 45 minutes and recovered 100 ft. of oil and 50 ft. of gas-cut oil and mud. Another test at 3,490-3,518 ft. with the tool open for 2 hours had a recovery of 1,180 ft. of gas, 25 ft. of mud-cut oil, and 20 ft. of oil-cut mud. Total depth is 3,551 ft. The well is about 1 mile south of the town of Liberty.

In Wayne County, Gulf Refining Co. is drilling ahead after a show of gas at 1 C. P. Borah, NW NW SE 31-1s-9e, southwest of Half Moon pool. The well had the Ste. Genevieve at 3,282 ft. and a 1-hour drill-stem test at 3,334-56 ft. recovered 75 ft. of gas and 35 ft. of mud slightly cut with oil.

On the west side of Crossville pool in White County, Ashland Oil & Refining Co. is cleaning out to test the Tar Springs at 1 W. T. Hardy, SW SW SE 35-4s-10e, about 2 miles south of the town. The well had a recovery of 5 ft. of oil and 30 ft. of mud on a 1-hour drill-stem test at 2,372-86 ft.

Edgar County has two wildcat wells that are showing some oil. M. L. Livengood 2 Stoneburner, SW SW SE 3-13n-13w, is cleaning out after another acid treatment of the Osage at 570-631 ft. The well pumped 12 bbl. of oil and 35 bbl. of water per day. To the south and near the town of Grand View, L. L. Groff 1 I. B. Clapp, SW SW SE 33-13n-13w, is pumping on beam and is reported to have made 7 bbl. of oil in 35 hours. Total depth is 568 ft.

In Gallatin County and south of Roland pool, George & Wrather 1 Harry Miner, NW SW NW 24-7s-8e, has been completed in the Rosiclare at 2,974-86 ft. with an initial production of 10 bbl. per day.

ILLINOIS SUCCESSFUL WILDCAT

Gallatin County: George & Wrather 1 H. Miner, NW SW NW 24-7s-8e, IP 10 bbl., Rosiclare 2,974-86 ft., TD 3,050 ft.

ILLINOIS WILDCAT FAILURES

Christian County: O. Oldfield 1 W. Albert, SW NW SW 32-14n-1e, dry, TD 2,337 ft.

S. D. Jarvis 1 R. Dorst, SW SW NE 29-11n-1w, dry, TD 2,632 ft.

Franklin County: W. G. Fortner and J. V. Nan Natta 1 Johnson, SE NW NE 27-5s-3e, dry, TD 3,064 ft.

Gallatin County: T. A. Ferrell 3 C. I. Oldham, S½ NE SW 24-9s-9e, dry, TD 2,804 ft.

Jefferson County: W. S. Seigler 1 B. Wakefield, SE SE NE 3-3s-2e, dry, TD 2,780 ft.

Montgomery County: J. R. Bradshaw 1 Schluckebier, NE SW NE 19-7n-3w, dry, TD 2,108 ft.

LA.-ARK.

Barnsdall Cores Ahead In Cotton Valley

SHREVEPORT.—In Bossier Parish, Barnsdall Oil Co. 1 Ardis & Co., 27-22n-11w, cored ahead in the Cotton Valley below 8,626 ft. Recovery from 8,608-26 ft. was 3 ft. of shale, 1 ft. of black non-porous siltstone with gas odor, 4 ft. of shale and 3 ft. of silty and slightly porous sand with gas odor.

S. M. Aronson 1 Sentell, 23-19n-14w, Caddo Parish, was drilling Travis Peak at 6,405 ft. Phillips Petroleum Co. 1 Ellerbe, 17-15n-12w, was fishing drill collars lost at 8,712 ft., total depth.

In Claiborne Parish, Hunt Oil Co. was rigging up for a deep wildcat at the 1 J. H. Owens, NE NE 19-23n-6w. Hunt's Smith, Smackover wildcat in 10-23n-7w, was drilling below 10,499 ft. H. W. Klein 1 Sims, 34-20n-5w, ran a 30-minute drill-stem test at 9,724-32 ft., which recovered the 900-ft. water blanket plus 300 ft. of gas-cut mud. Operators squeezed and reperforated at 9,724-32 ft., attempted a drill-stem test and lost tubing in the hole.

C. R. Schuster 1 F. M. Dance, new Cotton Valley operation in 20-19n-6w, Claiborne Parish, was drilling below 3,513 ft. It is 3 miles southwest of the Sugar Creek field.

The Texas Co. 1 Hesser, 23-11n-1w, De-Soto Parish Rodessa test, was drilling Massive anhydrite below 3,910 ft.

Zeke Lohman 1 Brown Paper Co., 8-9n-8w, Natchitoches Parish, was awaiting orders at 4,017 ft., in the Tuscaloosa. It has reported no shows.

The California Co. 1 Brown Paper Mill, 10-16n-3e, Ouachita Parish, was coring in the Cotton Valley below 9,737 ft. Recovery was tight lime and shale.

Union Oil Co. of California 1 Long Bell Lumber Co., 35-7n-13w, Sabine Parish, was drilling in the upper Cretaceous at 3,630 ft.

Continental Oil Co. 1 Mansfield, 34-13n-4w, Winn Parish, stopped to run electric log at 10,199 ft. Sample top on the Travis Peak was 9,370 ft.

Macmillan Petroleum Corp. 1 C. Nash, SE NW 35-18s-15w, Union County, Arkansas wildcat, was drilling below 7,333 ft., after running electrical log to 6,716 ft. It logged the Travis Peak at 3,792 ft., and the Cotton Valley at 5,312 ft., with elevation of 241 ft.

Lee & Burnett 1-B Sivley, 35-12s-31w, Little River County, ran a 30-minute drill-stem test from 3,198-3,218 ft., which recovered 75 ft. of mud with no shows. It was coring ahead below 3,220 ft.

NORTH LOUISIANA WILDCAT FAILURE

Natchitoches Parish: Zeke Lohman 1 Brown Paper Co., 8-9n-8w, dry, TD 4,012 ft., Midway 1,443 ft., Arkadelphia 2,302 ft., base chalk 3,974 ft., elev. 204 ft.

Oil Divorcement Bills Go To Senate Commerce Group

WASHINGTON.—The Senate judiciary committee has relinquished jurisdiction over the three divorcement bills introduced by Sen. Guy M. Gillette of Iowa and turned them over to the Senate interstate commerce committee.

The measures, separately, call for prohibiting interstate common-carrier pipe lines from transporting commodities in which the carriers have any interest; divorcement of the business of producing, refining, and transporting petroleum products from that of marketing them; and prohibiting producers, refiners, and marketers from operating tankers and barges.

STATISTICS and T

WEEKLY WELL COMPLETIONS . . . WEEK ENDED MARCH 26, 1949

	Total of all wells					12 wk.		Wildcat completions and discoveries					Cumulative total, 1949				
	Comp.	Oil	Gas	Dry	Footage	1949	1948	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	22	11	0	*11	22,809	273	334	0	0	0	0	0	0	0	0	0	0
Pennsylvania	30	15	1	†14	50,593	404	616	0	0	0	0	0	0	0	0	1	1
West Virginia	11	2	8	1	26,593	115	171	0	0	0	0	0	0	0	3	2	5
Ohio	22	7	5	10	53,340	254	260	1	0	0	2	3	1	0	1	8	10
Indiana	19	6	0	13	31,760	216	205	0	0	0	5	5	2	0	0	49	51
Kentucky	19	6	7	6	58,276	185	131	0	0	0	2	2	2	0	0	11	13
Illinois	39	24	0	15	104,423	448	417	1	0	0	6	7	7	0	0	72	79
Michigan	18	7	0	11	37,680	206	141	2	0	0	8	10	8	0	1	78	87
Kansas	46	20	1	‡25	139,719	629	569	0	0	0	5	5	11	0	2	82	95
Neb., Mo., Iowa	0	0	0	0	4	1	0	0	0	0	0	0	0	0	0	1	1
Oklahoma	93	54	3	36	319,385	787	806	3	0	0	15	18	33	6	5	114	158
Texas	222	149	8	65	957,796	2,857	2,282	13	1	1	34	49	101	7	19	479	606
North Central (Dist. 7-B & 9)	78	48	1	‡29	208,876	902	671	6	0	0	9	15	54	0	1	182	237
West (Dist. 7-C & 8)	43	39	0	4	246,261	632	627	4	0	0	4	8	12	0	0	38	50
Panhandle (Dist. 10)	15	15	0	0	46,206	261	115	0	0	0	0	0	0	0	0	0	0
Eastern (Dist. 5 & 6)	17	10	3	4	93,556	156	107	0	0	0	3	3	0	1	2	25	28
Gulf Coast (Dist. 2 & 3)	31	17	4	10	204,157	420	377	2	0	1	5	8	19	3	12	91	125
Southwest (Dist. 1 & 4)	38	20	0	18	158,740	486	385	1	1	0	13	15	16	3	4	143	166
Louisiana	37	25	0	12	218,597	465	382	3	1	0	3	7	9	3	0	39	51
Northern	16	11	0	5	33,064	240	240	0	0	0	1	1	0	0	0	19	19
Southern	21	14	0	7	185,533	225	142	3	1	0	2	6	9	3	0	20	32
Arkansas	4	2	0	2	20,912	55	67	0	0	0	0	0	1	0	0	14	15
Mississippi	5	2	0	3	42,665	78	89	0	0	0	2	2	2	0	1	20	23
Southeastern States	2	0	0	2	7,802	13	9	0	0	0	2	2	0	0	0	12	12
Montana	7	6	0	1	14,628	41	52	0	0	0	0	0	1	0	1	5	7
Wyoming	19	11	1	7	111,595	124	89	1	0	0	4	5	5	0	0	23	28
Colorado-Utah	3	3	0	0	12,603	29	60	0	0	0	0	0	1	0	0	9	10
New Mexico	10	7	1	2	48,533	123	136	0	0	0	1	1	2	0	0	11	13
California	53	43	1	9	253,737	600	590	1	0	1	9	11	13	0	2	109	124
Total United States	681	400	36	245	2,533,446	7,903	7,406	25	2	2	98	127	199	16	35	1,139	1,389
Total previous week	674	388	59	227	2,542,958	¶7,222	6,851	24	2	4	87	117	174	14	33	1,041	1,262
Total March 27, 1948	555	336	51	168	1,984,645			7	2	10	53	72	157	16	62	1,031	1,266

Service wells included: *11, †14, ‡1.

CRUDE PRICES AND REFINERY ACTIVITY

GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Okla-homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$2.17	....	....	....
19-19.9	2.19	....	....	....
20-20.9	2.21	$2.25	....	$2.12
21-21.9	2.23	2.27	....	2.14
22-22.9	2.27	2.29	....	2.16
23-23.9	2.30	2.31	....	2.18
24-24.9	2.34	2.33	$2.56	2.20
25-25.9	2.38	2.35	2.58	2.22
26-26.9	2.41	2.37	2.60	2.24
27-27.9	2.45	2.39	2.62	2.26
28-28.9	2.49	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.56	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.62	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point. †Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. (For detailed price changes in all fields see The Oil and Gas Journal, January 1, 1948, page 107.)

A.P.I. REFINERY REPORT, WEEK ENDED MARCH 19

(Thousands of barrels)

District—	Crude runs, daily avg.	Production: Gasoline†	Kerosine	Gas & dist. oil	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline*	Kerosine	Gas & dist. oil	Residual
East Coast	761	2,347	269	1,109	1,474	27,544	7,641	17,610	10,787
Appalachian:									
District 1	84	294	39	71	88	2,866	401	692	460
District 2	67	209	24	39	104	1,266	125	188	257
Ind., Ill., Ky.	902	3,231	412	860	1,112	28,679	2,847	7,307	4,643
Okla., Kans., Mo.	441	1,610	229	503	539	13,306	712	2,824	2,202
Inland Texas	237	1,025	110	150	428	5,308	396	519	1,044
Texas Gulf Coast	1,250	4,077	471	1,981	1,597	20,625	2,824	8,880	9,792
La. Gulf Coast	439	1,373	335	673	429	5,682	1,973	3,005	2,801
N. La. and Ark.	75	190	53	105	106	2,626	432	801	165
Rocky Mountain:									
New Mexico	13	53	..	12	28	82	25	35	39
Other Rocky Mtn.	175	538	41	210	311	3,801	190	1,134	852
California‡	891	2,523	186	1,062	2,195	15,525	660	7,104	27,232
March 19, 1949‡	5,335	17,470	2,169	6,775	8,411	127,310	18,226	50,099	60,274
March 12, 1949‡	5,452	¶17,267	2,093	7,325	8,125	¶126,188	18,517	51,804	59,297

*Finished and unfinished. †At refineries including natural blended. ‡New basis in California, comparable data for 1948 not yet available. ¶Revised.

Bureau of Mines crude-oil stocks 267,343,000 bbl. as of March 19—up 3,172,000 bbl. One year ago 227,335,000 bbl.

FLAT CRUDE PRICES

Representative posted schedules per bbl.	
East Texas†	$2.65
Kettleman Hills, California*	2.14
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.75
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

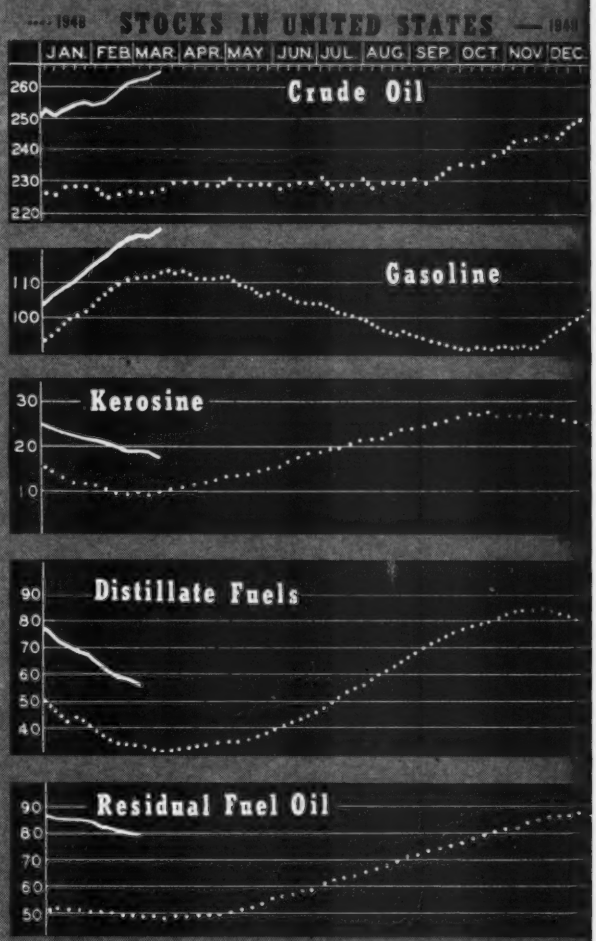
TRENDS

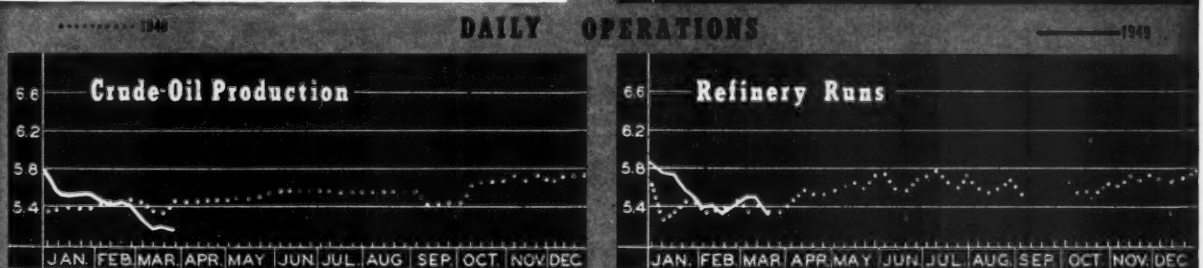
DAILY AVERAGE PRODUCTION FOR WEEK

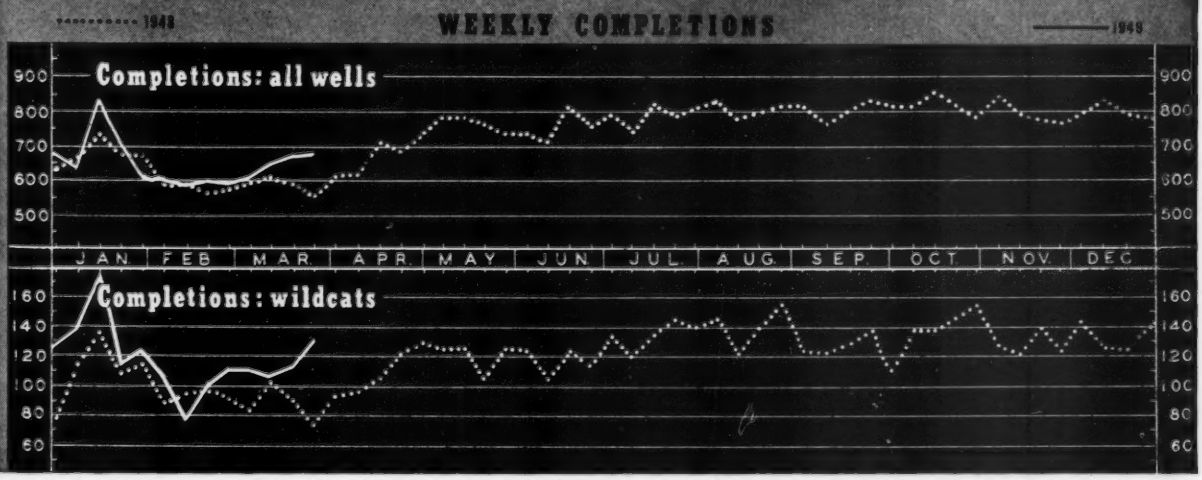
	Mar. 26 crude oil	B. of M. Mar. demand	Mar. 19 crude oil
Alabama	1,250	1,700	1,300
Arkansas	81,550	84,000	81,200
California	951,000	950,000	950,200
Colorado	*60,700	53,000	61,250
Eastern	60,000	62,300	61,450
Florida	1,300	1,300	1,100
Illinois	172,600	167,000	173,000
Indiana	22,600	22,000	21,900
Kansas	297,600	290,000	303,000
Kentucky	23,100	22,000	22,600
Louisiana	489,225	475,000	489,675
North Louisiana	117,350	.....	117,800
South Louisiana	371,875	.....	371,875
Michigan	42,600	45,000	43,750
Mississippi	103,900	125,000	107,200
Montana	25,300	24,000	25,200
Nebraska	300	700	300
New Mexico	135,400	125,000	135,400
Oklahoma	398,150	412,000	397,850
Texas	2,127,925	2,400,000	2,127,925
Dist. 1 (Southwest)	26,785	.....	26,785
Dist. 2 (Southwest)	139,425	.....	139,425
Dist. 4 (Southwest)	204,425	.....	204,425
Dist. 3 (Gulf Coast)	407,965	.....	407,965
Dist. 5 (Eastern)	42,050	.....	42,050
Dist. 6 (Eastern)	97,525	.....	97,525
East Texas field	273,000	.....	273,000
Dist. 7-C (West)	47,050	.....	47,050
Dist. 8 (West)	615,900	.....	615,900
Dist. 7-B (W. Central)	60,700	.....	60,700
Dist. 9 (N. Central)	126,000	.....	126,000
Dist. 10 (Panhandle)	87,100	.....	87,100
Wyoming	125,200	140,000	127,500
Total United States	†5,119,700	5,400,000	5,131,800
Change from prev. wk., dn.	12,100		

Total production January 1-March 26..... ‡458,419,035 bbl.
Same period last year (crude plus cond.).. 464,566,925 bbl.

*Incl. 200 bbl. of Utah production. †Not incl. 86,375 bbl. condensate. ‡Incl. 7,156,880 bbl. condensate.







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MARKETS

REFINED - PRODUCTS markets for the week were characterized by a slight firming in the demand for gasoline and continued weakness in burning oils.

The increase in the number of gasoline inquiries is an indication that some buyers are making plans for the summer supply even though most of them are not yet ready to make firm season commitments. Some suppliers feel that the outlook for a good contracted volume is much brighter now than it was a few weeks ago.

Refinery demand for gasoline for the entire country during the first 11 weeks of this year was about 9.4 per cent above the same period last year. This abnormal increase resulted from a marked gain in the number of vehicles plus the comparatively mild weather during the past winter. Even though the percentage increase over last year will not be as high during the summer as it has been for the past several months, most marketers expect a very good gasoline season.

With the peak of the heating season past and with inventories of heating oils still well above normal, kerosine and distillate prices moved to lower levels.

In the Mid-Continent area, gasoline continued the showing of strength as marketers plan for increased demand during the spring season. The generally stronger market for motor fuels has resulted in a firmer demand for natural gasoline and more of this product is moving to refineries. Increased use of natural gasoline was to be expected following the series of price reductions that brought the Group 3 price from 8½ cents in January to 5 cents early in March.

New York Gasoline Firmer

A firmer trend for motor-fuel prices was anticipated last week, but distillates and heavy fuel oil continued their downward movement. Esso Standard Oil Co. raised its gasoline prices ½ cent on the Gulf Coast effective March 22, and though spot trading in gasoline has very little momentum as yet in New York Harbor, it was felt Esso's move would be reflected in later transactions.

Esso's earlier broad reductions in the price of kerosine, No. 2 fuel, diesel, and heavy fuel oil were met March 23 in New York, New England, New Jersey, and partially in Pennsylvania by Socony-Vacuum Oil Co., Inc. Socony - Vacuum's new cuts brought its New York Harbor barge price for kerosine to 9.2 cents, for No. 2 to 8 cents, and for No. 6 fuel to $1.85. In Pennsylvania, Socony-Vacuum reduced the price for No. 5 and 6 fuel oil.

Despite these substantial cuts by major suppliers for products other than gasoline, spot-market deals were reported made at still lower figures. No. 2 was said to be available at around 7.5 cents in New York Harbor, and No. 6 at $1.75 or lower.

Gulf Trading Slow

The increase of ½ cent per gallon in gasoline price had little effect on spot-market trading in the Gulf Coast area last week. One observer pointed out that the higher price level will give a generally stronger tone to the over-all weakened petroleum - products market.

It was reported by one large refiner that some buyers are feeling a pinch due to the diminishing availability of sweet crude. This is particularly true of those refiners who are equipped to process only sweet crude.

Marketers continued to watch the crude-vs.-products price relationship and some felt that the answer will be found in the extent of gasoline demand increases this summer.

Representative Quotations

Representative spot-market quotations of leading suppliers as of March 28, 1949. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 73-75 octane	8⅞-9¼	10.9	9¼-10
Premium gasoline, 78-80 octane	9½-10¼	12	10¼-11
42-44 w.w. kerosine	8-8½	8.875-9.2	8¼-8¾
No. 2 straw fuel oil	7¼-7½	7.5-8	6¾-7¼
No. 6 residual	$1.00-1.10	$1.75-1.85	$1.35-1.45

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5	4½	4¾
Grade 18-55	6	5.4	5.7

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	12-13.5
750 vis., No. 3-4 neutral	15-16.5
2,000 No. 5-6 neutral	17-18.5

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	23
200 vis., No. 3 neutral, 0-10 pp.	14

Western Pennsylvania

144-155 vis. 10 p.t. bright stock	23.5-28
180 vis. 0 p.t. neutral	25.5-26.5

CRUDE-SCALE WAX
Mid-Continent

132-134 A.M.P.	5

EQUIPMENT MEN ... in the News

Drucker Named Catalytic Cost-Control Manager

Joseph J. Drucker, mechanical engineer, and long experienced in refinery construction, has been named manager of estimating and cost-control department of Catalytic Construction Co., Philadelphia. Drucker was associated with Foster Wheeler Corp. for 20 years, 16 of which he was the company's chief estimator.

During the past 4 years, Drucker has been chief estimator of the oil division of Arthur G. McKee & Co., resulting in more than 20 years' specialized training in oil-refinery construction costs. He is a graduate of Cooper Union Institute of Technology, with a degree in mechanical engineering.

Mikita to Direct du Pont Petroleum Laboratory

Promotion of Joseph J. Mikita to be director of E. I. du Pont de Nemours & Co.'s petroleum laboratory was announced recently. The laboratory functions as a unit of the technical division of the organic-chemicals department and conducts research on the performance of fuels and oils in automotive engines.

Appointment of the heads of three laboratory divisions also was announced. They are Richard O. Bender, chemical; Milton H. Campbell, engineering; and Robert H. Hobert, service.

Mikita came to du Pont in 1946 from The Texas Co. where he was associate director of research before joining du Pont in 1941; Bender had been a resident chemist at Sinclair Refining Co.'s Marcus Hook plant. Campbell started with the petroleum chemicals division in 1947 as a chemical engineer in the combustion engineering laboratory. Hobert came with du Pont following his graduation from Syracuse University in 1934.

Broderick & Bascom Boosts Zimmerman and Sieber

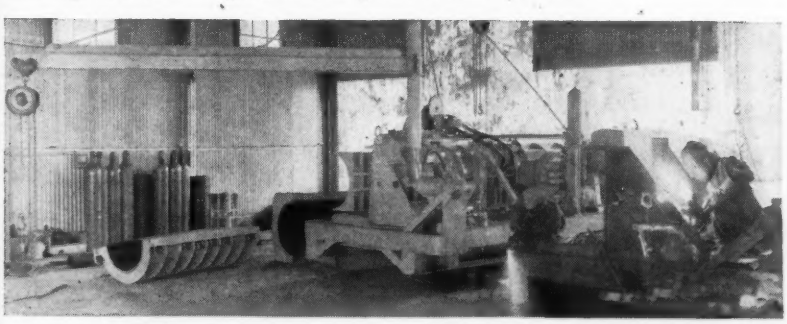
Broderick & Bascom Rope Co., St. Louis, announces two changes in executive responsibility. Fred Zimmerman, vice president, who has been in charge of sales, assumes the new title of director of sales. J. J. Sieber has been appointed sales manager.

F. ZIMMERMAN

J. J. SIEBER

Zimmerman joined Broderick & Bascom in 1911 and has been continuously with the organization since then. Sieber, a graduate of Washington University, St. Louis, has most recently been chief product engineer, operating from the home office.

Coody Bender Pipe-Bending Machine Plant



One of two production plants of Coody Bender Co., Houston. Pipe-bending machines manufactured in this plant are specially designed to cold-bend extra-large-diameter pipe. Co-owners of the company are John L. Coody, inventor; S. M. Butler; Ole Peterson; and Weed Peterson

Miss Dawes Made Avondale Marine Ways Comptroller

Miss Hettie M. Dawes has been appointed comptroller of Avondale Marine Ways, Inc., to succeed Henry Z. Carter, who was recently promoted to general manager. This announcement was made by James H. Bull, president of the New Orleans shipyard.

Miss Dawes is a graduate of North Texas State Teachers College and holds a degree of bachelor of arts. She first joined Avondale August 1942 as an assistant bookkeeper and has since risen to the position of chief accountant and now holds one of the top executive positions in the firm.

Oklahoma Glass Fiber Names Representative

Daniels, Beckley & Associates, Inc., 30 Rockefeller Plaza, New York City, has been appointed to represent Oklahoma Glass Fiber Corp. as export representatives in foreign markets.

F. W. Wallace Resigns

Fred W. "Pete" Wallace, vice president, sales manager, and columnist of Drilling Magazine, has severed his connection with that publication. Wallace has not announced his plans for the future.

Crose Makes O'Conner Export Representative

D. T. O'Conner, New York City, has been appointed export sales representative for M. J. Crose Manufacturing Co., Inc., of Tulsa. The Crose company manufactures a complete line of equipment for laying, cleaning, and wrapping pipe lines and is exclusive distributor of Vitron glass wrapping and Littleford kettles.

Besides M. J. Crose Co., O'Conner also represents Shaffer Tool Works, Brea, Calif., and Telematic Corp., Chicago.

Steward Joins Parsons

Clinton C. Steward has joined Ralph M. Parsons Co. in the capacity of chief engineer. He will replace Elwood Layfield, who has been moved

to the new position of manager of engineering and construction.

Oakes, Kurz, and Jones Get Link-Belt Promotions

J. H. OAKES

Link-Belt Co. announces the appointment of J. H. Oakes as sales manager, enclosed drives, with headquarters at the company's Philadelphia plant. He will be assisted by Harry F. Kurz as representative with headquarters in Chicago.

H. F. KURZ

ROY E. JONES

The company also announces that Roy E. Jones, heretofore assistant export manager, has been appointed export manager of the company with headquarters in New York City. He succeeds Carl A. Woerwag, who has retired from active service.

Bucyrus-Erie Promotes Cameron and Clark

Bucyrus-Erie Co., manufacturers of oil-well spudders, announces two new appointments in its Dallas office. W. J. Cameron became representative for well-drill sales. Previously, he represented the company as service engineer attached to the Dallas office.

Stepping into the service-engineer vacancy left by Cameron is W. S. Clark, formerly associated with Atwood & Clark, drilling contractors of Kermit, Tex. Both Cameron and Clark will be under the supervision of G. E. Ponder, Bucyrus-Erie district representative, well-drill sales, at the Dallas office.

Daniels and Beckley Form Oil Equipment Export Firm

Guy E. Daniels and Stewart D. Beckley have announced the merger of their organizations to form Daniels, Beckley & Associates, Inc., to serve as foreign sales representatives for manufacturers of oil-field equipment and materials. Their offices will be located at 30 Rockefeller Plaza, New York City, with a branch in Buenos Aires, Argentina.

Bowe Promoted to Manager Of East District Lab

E. I. du Pont de Nemours & Co., Inc., announced the promotion of Arthur F. Bowe to be manager of the eastern district laboratory of the Petroleum Chemicals Division. The laboratory is one of five established last year to serve oil refiners in connection with their use of tetraethyl lead and other petroleum chemicals marketed by the division. The eastern district laboratory serves the Atlantic Seaboard of the United States and Canada. Bowe formerly was acting manager of the Gulf Coast district laboratory at Houston. He came with de Pont in 1947, and until 1948, was supervisor of the analytical section of what is now the company's petroleum laboratory at Deepwater, N. J.

Meyer Assistant Manager Of National Supply Export

A. R. MEYER

A. R. Meyer has been appointed assistant sales manager of National Supply Export Corp., according to an announcement by E. M. Gretzler, vice president in charge of sales for the company. With headquarters in Rockefeller Plaza, New York City, Meyer will supervise the work of all departments of that office as well as assist in other activities of the Export corporation directed from New York.

Meyer first joined the sales department of National Supply Co. in Toledo in 1929, holding various positions in that department until 1940 when he was transferred to Dallas as sales representative. From 1946 until his present appointment he was American representative in New York City for Oil Well Engineering Co., Ltd.

Randolph Appointed Sales Manager for Oil Base, Inc.

THAD RANDOLPH

George Miller, president of Oil Base, Inc., announces the appointment of Thad Randolph to sales manager. He will be stationed at the home office and plant at Compton, Calif., in charge of sales for Black Magic oil-base drilling fluid, White Magic oil-emulsion mud, and OB mud guns.

Randolph joined Oil Base, Inc., in 1945 and rose to the position of manager of the Mid-Continent division at Oklahoma City. He worked for Stanolind Oil & Gas Co. as mud engineer until May 1937 when he joined Baroid Sales Division, Los Angeles. He will be replaced at the Oklahoma City office by Charles Piskac, who was representing Oil Base in the Los Angeles Basin at the time of his transfer.

Barnes Joins Clark's Technical Service

Clark Brothers Co., Inc., announce that W. H. Barnes is now a member of the company's technical service staff in their Tulsa office.

Barnes graduated from University

B. A. Myers Honored at Long Beach Luncheon

Former coworkers and friends at a luncheon given by Paul Cavins for B. A. (Bart) Myers, retired vice president of International Petroleum Co., Toronto, a subsidiary of Standard Oil Co. (N. J.), are: (clockwise from far end of the table) Cavins, Cavins Co.; R. J. Eiche, R. J. Eiche & Associates; L. S. Hamer, Hamer Oil Tool Co.; Jack Harpster, Security Engineering Co., Inc.; H. G. Haney, Thomas Pike Drilling Co.; S. P. Duffield, Thornbury Co.; R. B. Block, Cavins Co.; Harold Theroll, Eason & Theroll Tool Co.; G. W. Moore, Cavins Co.; Onos Lindsay, Eastman Oil Well Survey Corp.; T. J. Martin, R. J. Eiche & Associates; Owen Lake, National Supply Co.; William Bettis, M. O. Johnston Co.; Lee Chisholm, Shaffer Tool Works; K. E. Waggener, Shaffer Tool Works; Arnett Norcott, retired general manager, International Petroleum Co.; and Myers

of Oklahoma with a BS degree in chemical engineering in 1936 and from Massachusetts Institute of Technology, where he received an MS degree in chemical engineering in 1938.

Warren Petroleum Opens Madison Sales Office

J. T. BRADLEY

J. W. SCHRIEVER

A new district sales office has been opened at Madison, Wis., by the liquefied petroleum gas division of Warren Petroleum Corp., in order to facilitate the handling of the sizable increase in business experienced by that corporation in the north central states in the past 3 years.

J. T. Bradley, formerly of the Tulsa headquarters staff, has been promoted to district sales manager and placed in charge of the new office. J. W. Schriever, Jr., also has been transferred from Tulsa to Madison as district sales representative.

After graduating from University of Illinois, Bradley went to work for Warren in the labor gang at a plant then under construction at Madill, Okla. Upon completion of the plant, he was assigned first to the plant office and then to the laboratory, later being transferred to Warren's Galva, Kans., plant as plant chemist. Separated from the service in August 1946, he rejoined the Warren organization as a salesman.

Schriever joined the Warren organization in June 1948 and was immediately assigned to the duties of resident engineer during the construction of L.P.G. storage terminals at Des Moines and Cedar Rapids, Iowa. After completion of those terminals, Schriever was assigned to general engineering duties in the L.P.G. division in the Tulsa headquarters until his recent transfer to Madison.

Wallace and Garrett Get Taylor West Coast Spots

Two new salesmen for Taylor Instrument Cos., one located at Portland, Ore., the other at Los Angeles, have just entered their territories. A. M. Wallace, Portland, is a graduate of University of Denver and also spent 4 years at Newark College of Engineering, Newark, N. J.

R. M. Garrett, Los Angeles, is a chemical engineer from Ohio State University and also holds a master's degree in business administration.

Vandervoort Made Marlow Pumps Vice President

Election of Vincent Vandervoort as vice president of Marlow Pumps has been announced by A. S. Marlow, Jr., president of the company. A widely known New Jersey industrialist and banker, Vandervoort has been affiliated with the Marlow concern since 1947. In addition to his position with Marlow Pumps, Vandervoort is vice president of the Paterson Savings and Trust Co. and president of Alexander Hamilton Hotel Corp. He also is on the governing board of the New Jersey Manufacturers Association.

Young Is Promoted to Manager by Wolverine

J. L. Young, Jr., sales representative for Wolverine Tube Division with headquarters in Houston, has been promoted to manager of Southwestern sales. Young will headquarter in the company's Houston office and guide Wolverine sales throughout Texas, Arkansas, Louisiana, Oklahoma, and will supervise the operation of the company's mill depot located in Houston.

Curry Joins Manning, Maxwell & Moore, Inc.

Manning, Maxwell & Moore, Inc., have announced that Bryce B. Curry has been engaged as a field specialist for Hancock valves, manufactured in the company's Waterton, Mass., plant. Curry will make his headquarters in the Houston district office. His activities will cover the Gulf Coast area. Well known in the southwestern part of the country, Curry was formerly district manager for Jarecki Manufacturing Co. and for the United Supply & Manufacturing Co.

Continental Appoints Two New Store Managers

Continental Supply Co. has announced that John H. Brown, former floorman at Ellinwood, Kans., has been transferred to Russell, Kans., as store manager, succeeding Lawrence E. Young who has been appointed field salesman at the same location.

R. L. Handley, former bookkeeper for the company at the Duncan, Okla., store, has been transferred to Drumright, Okla., as store manager succeeding V. J. Preston, who has been appointed field salesman at Drumright.

Farrell to Represent Franklin in Tulsa Area

E. J. Farrell, formerly purchasing agent in the Chicago office for Franklin Supply Co., has been transferred to Tulsa as sales representative in the Tulsa district. He will work under the supervision of Lawrence Harper, vice president in charge of the Tulsa district.

Farrell has had extensive supply experience to qualify him for his new duties, having been store manager and field representative of the company's branch in Mount Pleasant, Mich., prior to serving as purchasing agent.

Caouette Made Rockwell Division General Manager

Ralph G. Caouette has been appointed general manager of the Pittsburgh Equitable Meter division of Rockwell Manufacturing Co. The announcement was made by L. A. Dixon, vice president in charge of meter and valve divisions.

Caouette has had a wide and varied experience with Rockwell, having been production superintendent of the Delta division before coming to Pittsburgh. Later he became manager of industrial engineering for all of Rockwell's plants. Before joining Rockwell, Caouette was industrial engineer for Minneapolis-Moline Implement Co.

McGuffy Goes to Shreveport

E. L. McGuffy has been placed in charge of Crane Packing Co.'s new Shreveport office in the Garrett Building. McGuffy has been with Crane since 1945, prior to which time he was associated for 10 years with United Gas Corp.

Brewster Now Offering Complete Field Service

Brewster drilling rigs located anywhere in the continental United States, and other make rigs located in the Mid-Continent area can now obtain speedy field service from the Brewster service department, recently organized by Brewster Co., Inc., Shreveport, La.

Herbert Wenk, who is well known throughout the Mid-Continent area, has been appointed manager of the

(Continued on page 173)

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED

All ads, 12 cents a word. Minimum charge, $3.00 per insertion.
Centered Line, any ad, $1.00.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

DISPLAYED, PER INCH

$12.00 per column inch per insertion
One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
10% Discount if 3 insertions are ordered at one time.
COPY DEADLINE, 9:00 a.m. Monday prior to each week's issue.

THE OIL AND GAS JOURNAL
P. O. Box 1260, TULSA, OKLAHOMA

EQUIPMENT FOR SALE

FOR SALE: 1—#3-A National drilling machine fully equipped with large Young drilling unit, complete string of drilling tools, wire lines, water tank, light plants, water pumps, etc. ALSO: 1—#3 National drilling machine with complete string of tools. Both of these units are in first-class condition, and have just completed wells. M. J. Le Vieux, Okemah, Oklahoma. Phone 381.

PACKAGED H_2S REMOVAL UNITS

We offer prompt shipment on skid-mounted hydrogen sulfide removal units for treating sour gas for pipe line or fuel gas purposes.

GRAFF ENGINEERING & EQ'PT. CO.
3415 Westminster, Dallas 5, Texas

EQUIPMENT FOR SALE

One type "E" Allis-Chalmers Double Pole Tractor Unit. One type "HM" Allis-Chalmers Single Pole Tractor Unit. P. O. Box 3246, Corpus Christi, Texas.

FOR SALE: Model "K" Cardwell, single drum draw works powered by G.A.K. Waukesha engine. Equipped with 90' "A" mast and sub skid. Priced for quick sale. Terms. Melton Supply Co., Seminole, Okla.

FOR SALE—Cardwell Draw Works, Model "L"—Air Clutches—A-1 Condition. Box 3246, Corpus Christi, Texas.

FOR SALE: 4 Reconditioned Aircooled Wisconsin Engines, 30 HP with clutch. One D201-P7-Reconditioned LeRoi Engine with clutch. One Y112-Red Seal Continental Engine, nearly new. One 1500 to 2500 Watt Gasoline Engine driven Westinghouse Light Plant on skids. P.O. Box 1544, Tulsa, Oklahoma, Phone 5-1103.

FOR SALE: Wilson Giant draw works, powered by 2—J.L.-1335 Buda engines and Wilson chain compound. Like new condition, with bargain price. Terms. Melton Supply Co., Seminole, Okla.

BULL WHEEL SHAFTS: 4000' 16" O.D., ½" Wall; 18" O.D. ⅝ and 1⅛" Wall, 9 to 12 foot lengths. Degen Pipe & Supply Co., Box 107, Red Fork Station, Tulsa, Oklahoma.

20,000 FT. 7" O.D. 20# No. 1 Grade, second-hand Lapweld Casing, $1.50 ft. 30,000 ft. 3½" O.D. 9.20# No. 1 Grade, Lapweld, second-hand Tubing, $.50 ft. Zanesville Tool and Supply Company, Zanesville, Ohio.

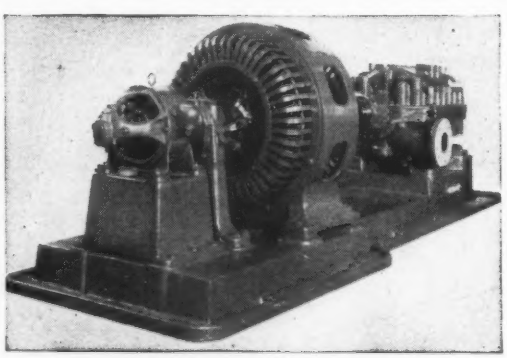
FOR SALE

12—230 H.P. Type 10 Bessemer New 17" Power Cylinders complete ready to run with 16" to 18" Compressors. 1—230 H.P. Clark Horizontal with Compressors. Located Salem, Illinois.

ENGLE PETROLEUM, Incorporated
Box 655, Evansville, Indiana

INGERSOLL-RAND 4HST6 HIGH PRESSURE PUMPING SET

West. syn. motor
400 h.p.
80% P.F.
2300 volts



6 stage
790 g.p.m.
600 lbs.
1800 r.p.m.

with West. Class 14-410 Red. Volt. Mag. Starter

OTHER PUMPING UNITS IN STOCK
COMPLETELY REBUILT—GUARANTEED LIKE NEW

4—760 gpm 1050 ft. 3600 rpm Goulds Fig. 3360 4-stage pump—Farrel 6/1 speed increaser—260 hp. 600 rpm Superior VDMB 6 cyl. diesel engine

1—475 gpm 1760 ft. 3550 rpm Goulds Fig. 3360 6-stage pump—Falk 8.89/1 speed increaser—300 hp. 400 rpm Superior YLO 5 cyl. diesel engine

TAMPA ARMATURE WORKS, INC.
TAMPA, FLORIDA

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

SAVE WITH SAFETY—Very Good Used Wire Line—Any Size or Length up to 5,000' —Respooled for Your Inspection — Cable Tools For Sale. General Tool & Supply Co., P.O. Box 4387, Phone 61335, Oklahoma City, Okla.

FOR SALE: 4500' of used 4½", Range #1, left hand drill pipe. 22' lengths. Location Odessa, Texas. Price $1 per foot. The Clay Bros. Drilling Co., Inc., 1804 Fair Building, Fort Worth, Texas.

FOR SALE: Used, Franks single jackknife derrick, Franks traveling block and hook. Franks slim hole rotary with 3½, 4½, and 5 inch slips. Equipment in excellent condition and formerly used on Franks 3000' slim hole rig. Box 70, Duncan, Okla. Phone 522.

WELL drilling spudders, beams, light rotaries, core drills, tools, casing. Used equipment at money saving prices. Spang and Mills new tools. Leschen lines. Everything for well drilling. Pressey & Son, Pueblo, Colo.

125,000' 2⅜" O.D. 4.60# used, R-I Upset Tubing, 11½ V-thread at 38 cents. 160,000' 2⅜" O.D. 4.50# used, R-I regular tubing, 11½ V-thread at 28 cents. A-1 condition. Can also be used for line pipe. Box C-836, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPELINE Construction Equipment for Sale: One spread, suitable for work up to 12", very reasonable. C. W. Sternberg, 8250 Wier Drive, Houston 17, Texas. Phone Preston 7043.

FOR SALE: Combination Rotary and Spudder. Have been drilling 1980 ft. production. 1—P.A. 100 International Motor. Rig and motor are in perfect shape. Ready to start making hole, either rotary or cable tools. Terms. F. T. Wolfe, 1716 11th St., Wichita Falls, Texas.

FOR SALE: One No. 10 Unit Rig Draw Works with Two D13000 Caterpillar Diesel Engines Compounded. Equipment in good shape. Kiowa Drilling Company, Inc., 717 Union National Bank Building, Wichita 2, Kansas. Phone 3-8013.

FOR SALE: At our Oklahoma City warehouse 3,000' 10" Naylor, 1,200' 16" Naylor Spiralweld, suitable for irrigation or conduit uses. 75 cents and $1.50, take entire quantity either or both sizes. Cities Service Oil Co,, Patridge, Bartlesville, Oklahoma.

USED PIPE A-1
Can accept or reject any quantity.
120,000 ft. 6⅝" OD 17.9# seamless, range 3, PE
75,000 ft. 4½" OD 8.64# seamless, range 3, PE
150,000 ft. 10¾" OD 28# PE cleaned and beveled
100,000 ft. 10¾" OD 31# PE cleaned and beveled
200,000 ft. 12¾" OD 35# PE cleaned and beveled
60,000 ft. 7" OD 20# PE cleaned and beveled
50,000 ft. 6⅝" OD 19.45# T&C

W. C. BERRY
Box 1858, Tulsa, Oklahoma, Phone: 3-6141
Dallas, Texas
1509 Mercantile Bank Bldg.
Phone: Central 2950

PARTS FOR ARMY TRUCKS

New and Used

Largest stock in America, 6x8, 6x4, 4x4, 4x2. All items guaranteed. Largest auto wrecking house in the west with most complete stock of new and reconditioned parts for all cars and trucks. New jeep power units complete with radiators and stub shafts. Fast service.

PIONEER AUTO WRECKING CO.
732 W. 13th Ave. Denver 17, Colo.

EQUIPMENT FOR SALE

FOR SALE: Complete Natural Gasoline Plant and gathering lines. Located near Bristow, Oklahoma. Entire unit or part. Victor Gasoline Company, P.O. Box 1733, Tulsa, Oklahoma. Phone 2-5263.

FOR SALE: 10,000 ft. 20" OD x ¼" Wall New Electric Weld Steel Pipe, Double Random Lengths; 50,000 ft. 18" OD x ¼" Wall Used Steel Pipe, Single Random Lengths. Utility & Industrial Supply Company, 921 Michigan Ave., E., Jackson, Michigan.

7,000 FEET 2½" threaded and coupled black line pipe excellent condition twenty foot random lengths, reasonable price. K. W. Porter Box 596, Effingham, Ill. Phone 207.

FORT WORTH Super-N and Model-N Spudders with tools. Very good condition. Can drill 1500 feet. C. S. Turet, Box 206, Great Bend, Kansas. Phone 5082 or 6624.

FOR SALE: Ex-warehouse, new seamless A.P.I. internal upset drill pipe, approx. 16,000 ft. 5½"-21.90, 500 ft.-13.30 and 4,000 ft. 2⅞"-10.40. Write: Box C-846, The Oil and Gas Journal, Tulsa, Oklahoma.

1—M 300 Halliburton wire reel, complete with measuring head, 8,000 feet .072 wire line. $225.00. 1—M 611 Halliburton automobile mounting bracket. $60.00. Tuboscope, Beacon 3-7431, Victory 4-3764. (Houston, Tex.)

MANUFACTURERS LATEST DESIGN

Hydraulic Casing Pulling Units. Complete line of equipment. Units made to your specifications. Truck Mountings or Skid Units. Repair Service and Parts

OKLAHOMA MACHINE & SUPPLY CO
Ada, Oklahoma

FOR SALE

3713 feet 9⅝ O.D. 40.6# Seamless Oil Well Casing. Run in well but in excellent condition. Priced to sell.

1—125 H.P. 350# Working Pressure "Oil Well Boiler," completely reconditioned and in excellent condition. State inspected. $2250.00 our yard, Okla. City.

POWELL BRISCOE, INC.
1916 First National Bldg.
Oklahoma City, Okla.

FOR SALE

1947 Beechcraft Bonanza, good condition, 550 hours on plane and motor. Has in addition to regular equipment, a D. F. radio, gyro compass, attitude gyro, 3 three-minute flares, seat covers and a plastic propeller. Will trade for petroleum products or sell for cash.

Box C-840

The Oil and Gas Journal
Tulsa, Oklahoma

FOR SALE

NEW CASING AND LINE PIPE

25,000' 5½" 15½# 8RT J55 R2 API Smls. Casing
15,000' 7" 23# 8RT J55 R2 API Smls. Casing
6,000' 8⅝" 28# 8RT J55 R2 API Smls. Casing
4,641' 9⅝" 36# 8RT J55 R2 API Smls. Casing
7,015' 10¾" 40½# 8RT J55 R2 API Smls. Casing
19,000' (893 Joints) 6" Std. Byer's Wrought Iron L.W. Plain End Pipe (ASTM A72-33)

Above subject to prior sale.

THE NATIONAL COOPERATIVE REFINERY ASSOCIATION
P.O. Box 770 McPherson, Kansas
Phone 820

EQUIPMENT FOR SALE

FOR SALE at Oklahoma City: 3 Used 9½"x14" Type VTH Clark Compressor Cylinders for vertical engines. Cities Service Oil Co., Patridge, Bartlesville, Okla.

SHOT HOLE drill, on 1941 Ford truck, Hyd. lift mast, chain pull down, 3" kelly, 4½ x 6 G.D. pump, twin disc clutches. Waters Drilling Service, 69 Beacon Place, Pasadena 8, Calif.

DRILLING IN Units—2 Complete Beam Type Units with A frame masts and 5" Tools. One with WOK Waukesha; other has D 13000 Caterpillar. Beardmore Drilling Company, 603 Petroleum Bldg., Wichita, Kansas.

PIPE MACHINE FOR SALE

One Bignall Keeler motor driven Pipe Machine in good condition. Threads pipe from 2" to 6". Dies included up to 6". Oil Field Salvage Company, Box 1362, Odessa, Texas.

WANT to Trade Unit 15 draw works, 3 WAKU Motors 127 ft. Moore Jacknife Mast purchased new Nov. 1948, Drilled 3 wells total 12,500 feet complete with all accessories ready to drill. Located in northern Oklahoma. Want smaller rig preferably 3500 to 4000 ft. P. O. Box 1979, Wichita, Kans.

FOR SALE IN STOCK, Quick Delivery: New Welded Steel Tanks and bolted; Used welded and bolted Steel Tanks, for Oil, Water, Gasoline, Grain, etc. Tool Houses, any size, built ready to go. Call or write.

INDEPENDENT TANK CO.
Phone 911, Box 102 Seminole, Okla.

STEEL STORAGE TANKS

12—55,000 BBL.
2—18,000 BBL.
1—17,500 BBL.
1—15,000 BBL.
7—5,000 BBL.

HORWITZ PIPE & STEEL COMPANY
P. O. Box 2534, Tulsa, Okla.
Phone 2-9128

FOR SALE

DIESELS AND PUMPS

3—New unused 475 BHP 5 cylinder Baldwin Model VG Diesel Engines, one connected to Ingersoll-Rand Multi-stage Centrifugal Pump with Farrell-Birmingham Step-up Gear and two connected to Worthington Horizontal Triplex Double Acting Pumps, all units complete with Falk couplings, Lummus Coolers, other accessories. Location Ohio, immediate shipment. Direct inquiries to

THE BUCKEYE PIPE LINE COMPANY
Joseph Steele, Purchasing Agent,
Room 2200, 30 Broad St., New York 4, N. Y.

RECONDITIONED SEAMLESS TUBING

95,000 ft. 1½" O.D.
120,000 ft. 2" O.D.
55,000 ft. 2¼" O.D.
75,000 ft. 3½" O.D.
80,000 ft. 4" O. D.
21,000 ft. 5½" O.D.

Single or Double Random Lengths—
Plain Ends.
Beveled for Welding.
Approx. 10 Ga. Wall.
Ideal for oil and gas lines.

Sonken-Galamba Corp.
2nd and Riverview (X-425)
KANSAS CITY 18, KANSAS
THatcher 9243

EQUIPMENT FOR SALE

STEEL STORAGE TANKS: 1—1500 Bbl. Capacity, 1—8000 Gallon Capacity ½" Plates, 1—Blackmer Pump Complete with 7½ H.P. Motor. C. P. Scanlon, 3109 Pioneer Avenue, Pittsburgh 26, Pennsylvania.

FOR SALE: Fort Worth Spudder complete with Power Unit, now located near Pampa, Texas. Moran Bros. Inc., 350 Nacol Building, Wichita Falls, Texas.

FOR SALE

Tubing, 2" Upset, 15,000 ft., used, A-1 condition. Ideco Drilling Rig, steel mast, rubber shock absorbers, 50 Franklin engine. Generating Plant, ready 20 K.W., 440, 3 phase, International U-9, gas, gasoline engine.

OIL PRODUCERS, INC.
314 Murray Bldg., Grand Rapids, Mich.

STEEL STORAGE TANKS

Railroad Tank Car Tanks
6,500 to 12,000-Gal. Cap.
Coiled and Non-Coiled
Cleaned—Painted—Tested
Heavier—Safer—Cheaper
Other Tanks Too
Also—Complete Tank Cars
8,000 and 10,000-Gal. Cap.

Your Inquiries Solicited

NEWHALL-MARSHALL-WOOD, INC.
30 Church Street, New York 7, N. Y.
Phone: COrtlandt 7-8096

EQUIPMENT WANTED

WANTED: 3½" OD or 4½" OD used drill pipe, 3½" OD line pipe or tubing. SCHAFER FLOW, INC. Box 578, Pratt, Kansas. Atten.: J. L. Crowder.

10 HEAVY drill collars to run in 6" hole not over 20' each—with 3½ Hughes-Acme joints. Gray Well Drilling Co., Delafield, Wis. Phone 1051, Post Box 181.

WANTED

Five 12 x 12 Cylinders for XOB Ingersoll-Rand Compressors

THE DRILLERS GAS COMPANY
Union National Bank Bldg.,
Wichita, Kansas
Phone 3-1228

WANTED

Hyster Towing Winches Models
D8N—D7N—D6N

Box C-825, The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

EXPERIENCED and rounded Land Man for large company, preferably with Texas experience. Age limit 45 years. Inquiries will be treated confidentially. Box C-801, The Oil and Gas Journal, Tulsa, Oklahoma.

ESTIMATOR

Experienced Engineer familiar with Oil Refinery design and capable of estimating process equipment from flow diagrams. Give full information, experience record and salary expected.

Arthur G. McKee & Co.
2300 Chester Ave.
Cleveland 1, Ohio

HELP WANTED

CORROSION ENGINEERS
Graduate Engineers, under 30, two or more years' experience in survey and installation work on pipe lines. Sohio Pipe Line Company, P. O. Drawer D-15, St. Louis, Missouri.

WANTED: Machinist Foreman. Ten years supervisory experience in engine maintenance and machine shop practice. Familiarization with oil refinery machinery desirable but not essential. Write giving training, experience, references and personal details to: The Carter Oil Company, P.O. Box 2094, Billings, Montana.

3 Drillers experienced on drilling with Fairbanks-Morse diesels to depths of 9,000 or 10,000 feet. In applying give experience and references. P. O. Box 1743, Tulsa, Oklahoma.

OLD and established manufacturer of oil well equipment wants manufacturer's representative for Gulf Coast territory, with headquarters in Houston. Require high class man. State age, experience, whether married or single, give references. Box C-851, The Oil and Gas Journal, Tulsa, Oklahoma.

GRAVITY PARTY CHIEFS: We have several attractive openings in domestic work for experienced and well qualified Party Chiefs. Best opportunities in the industry. Box C-804, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—PUMP SALES ENGINEER
Must be familiar with the types and makes of Centrifugal and Reciprocating pumps used in the Refining and Process industries and experienced in the selection and application of this type of pumping machinery to meet the requirements of these industries. Position includes selection and application of centrifugal and reciprocating pumps, estimating, handling sales correspondence and sales development work in our Indianapolis Sales Department. Please give detailed description of qualification and experience listing positions held with previous employers. All replies will be kept in strictest confidence.

DEAN BROTHERS PUMPS, INC.
329 West Tenth Street
Indianapolis 7, Indiana

WANTED

Kansas Independent Refiner has opening for young, aggressive salesman refined products tank car and tank truck delivery to Mid-Western markets. Must be familiar with refining operations and equipment using products, especially diesel engines and home burners. Give age, experience and references. All our employes know of this ad.

Box C-831
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

Engineer Wanted

Graduate engineer experienced in the design of drilling rigs is offered a permanent position with old, reliable and progressive independent company located in the Southwest. Give background and experience. All answers confidential.

Address Box C-847

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

HELP WANTED

ENGINEERS, Executives, Technical Men: Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection, will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

ENGINEERING

During the next several months we will increase our Engineering Organization engaged in the design of Oil Refinery Plants and Power Plants. Location Cleveland, Ohio. The men we need should be qualified as draftsmen, designers, checkers or in higher engineering skills on design of piping, instrumentation, pressure vessels, structural steel, concrete, mechanical or electrical. For presenting your qualifications and prompt consideration, write to us for application form.

ARTHUR G. McKEE & CO.
2300 Chester Ave., Cleveland 1, Ohio

Construction Superintendent for supervisory work on refinery and gasoline plant construction; must have minimum of ten years field experience either as construction engineer or construction superintendent and be thoroughly capable of handling large projects. This is a permanent, responsible position and will require an extremely high type of executive; man selected will be thoroughly investigated. Reply in own hand writing, giving full details as to age, education, training, and salary desired. Under experience, name the companies where previously employed, the projects employed on, responsibilities involved and previous salaries as well as name and address of your superiors. Address Box C-827, The Oil & Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

ACCOUNTANT: 8 Years experience in all phases of accounting, office and tax work with independent oil operator. Desire change with opportunity for advancement. Age 33, B.B.A. degree. Box C-844, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: Age 36. Experienced Mid-Continent and Rocky Mountains as executive and production superintendent in all phases oil field operations including leasing, evaluations and negotiating drilling deals. Capable full responsibility for drilling, completion and production. Some geology. Desire responsible connection with active organization. Domestic or foreign. Box C-842, The Oil and Gas Journal, Tulsa, Oklahoma.

GO WEST, YOUNG MAN
GEOLOGIST, recent grad, presently located in east, wishes to heed journalist's advice. Have sound preparation, imagination, resourcefulness; some experience in field and around drilling rigs. Interested exploration. Box C-849, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST wants position with ACTIVE independent or individual desiring to enter the oil business. Experienced in development; exploration, including surface and subsurface geology, gravity and seismic interpretation; developing and executing drilling deals; and leasing. Capable of directing exploration campaign and passing on deals submitted. Have worked in most producing states of south and southwest, and have wide acquaintance among oil men and geologists of these areas. Prefer to work on salary-plus-interest basis. Additional information if interested. Write Box C-850, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

ROYALTIES IN HOT AREAS!
Recent strikes have focused attention on Montana's deeper oil zones and major companies are moving fast, drilling and leasing. We buy direct in the field, sell direct to our customers. Write LANDOWNERS ROYALTIES COMPANY, Box 1225, Great Falls, Montana.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing, Catalog and Samples on request. Burkhart Printing & Stationery Company, 118 South Cincinnati, Tulsa 3, Oklahoma.

SERVICES

RADAR Surveys: Latest mobile radar equipment installed in Jeep and modified for oil exploration. Locates and outlines areas of possible oil saturation. Defines faults. For further information write Geotronic Laboratories, 421 S. Locust St., Centralia, Illinois.

PECOS DRILLING COMPANY, INC.
DRILLING CONTRACTORS "Cable Tools"
302 CARPER BUILDING, TELEPHONE 849
ARTESIA, NEW MEXICO

DIRECTORY large oil companies operating South America, Middle East, showing where apply for jobs overseas. $2.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla. (domestic directories also).

SUPERIOR TESTING LABORATORY
P. O. BOX 223
SANDOVAL, ILLINOIS
Petroleum Inspection a Specialty. Prompt Service, Reasonable Rates.

LEASE AND DRILLING BLOCKS

DRILLING BLOCKS — Bought and sold, Wyoming, Montana, and Utah. Eddie Fisher, Atlantic 0-4914, 2804 South San Gabriel Blvd., San Gabriel, Calif.

PRODUCTION WANTED
Large resources for good developed properties up to large size production, or a company's producing oil properties. Must stand investigation. Principals or his agent. Negotiations strictly confidential. Box C-833, The Oil and Gas Journal, Tulsa, Oklahoma.

TENNESSEE—88,000 acres timber land—$3.50 per acre, all minerals included. Details: Earl Jester, 12744 Vanowen, North Hollywood, Calif.

GEOLOGIST with extensive knowledge of good oil plays in Wyoming and adjacent states wishes contact with individuals or company willing to go "all out" on an exploratory and wildcat play on a share basis. Cite specifically, who you are, references and financial backing. Write Box C-848, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL LEASES for sale in large, small or medium size blocks in Colorado, Wyoming, New Mexico, Montana, Arizona. Wholesale or retail. Write for descriptive list. Dyer-OJ, 1835 Champa, Denver, Colorado.

LEASES ROYALTIES
PRODUCING OR NONPRODUCING
Texas, New Mexico, Oklahoma, Louisiana and Illinois
Inquiries Invited
B. D. BUCKLEY
60 Broadview Drive, Clayton (5), St. Louis, Missouri

FOR SALE

SMALLEST, Prettiest, Miniature Tri-Cone Rock Bit made. Less than one-half inch diameter. Cones turn. Gold or Nickel plate. On tie chain clasps, strap type for watch fobs and ring type for charms. $5.00 each Money Order or C.O.D. H. McGaughey, P. O. Box 11063, Houston, Texas.

Equipment Men

(Continued from page 169)

department. With 15 years' field experience and a broad engineering background Wenk is well qualified to direct the activities of this new department.

Brown Appointed Chief Engineer for Brewster

Appointment of Walter Brown as chief engineer of Brewster Co., Inc., of Shreveport, La., has been announced by Harry S. Marioneaux, president and general manager. Brown has been connected with Brewster as assistant chief engineer for more than a year. In his new position Brown will be in charge of design and mechanical engineering for all Brewster matched drilling equipment.

During his 20 years' experience in the oil and petroleum-suppliers industry, Brown has been associated with the engineering department of some of the country's leading manufacturers of drilling equipment and has invented and developed a number of devices now extensively featured in pipe-line and drilling equipment.

A. O. Smith Establishes Heat Transfer Shop

Establishment of a shop with complete production facilities for the manufacture of heat-transfer equipment has been announced by the vessel division of the A. O. Smith Corp.

The division also announced the appointment of P. A. Thompson as a product supervisor for heat-transfer equipment. Thompson has been in the heat-transfer and petroleum-processing industries for 25 years. He comes to A. O. Smith after 18 years with the Alco Products division of American Locomotive Co. Among his positions with Alco were New York district manager, assistant manager of commercial development, and manager of oil-industry sales.

Faxon Appointed Byron Jackson Sales Engineer

R. D. FAXON

O. W. Morgan, Jr., general sales manager of Byron Jackson Co., oil-tool division, has appointed R. D. Faxon as sales engineer with headquarters at Alice, Tex. Faxon, a graduate of Princeton University, was employed by Socony-Vacuum Oil Co. as a petroleum engineer at Zulia, Venezuela. Returning to the United States in 1948, Faxon joined Byron Jackson in his present capacity.

Keast Goes to Dallas As Cummins Sales Engineer

RICHARD KEAST

Appointment of Richard Keast as sales engineer for Cummins Sales & Service, Inc., in the Dallas area has been announced by J. E. Everroad, recently elected president and general manager of the corporation.

Keast will handle the sales of Cummins diesel engines from the Dallas office, located in the Magnolia Building. He has widespread knowledge of industrial diesel-engine application. Before coming to Cummins Sales & Service, Inc., he was associated with Autocar Sales & Service of Dallas.

Meadows and Stose to Head Sam Tour Departments

Sam Tour & Co. has announced the reorganization of its mechanical-engineering department under the supervision of John J. Meadows, who has just joined the organization. For the past 5 years Meadows has been engaged in consulting work and brings with him an extensive knowledge of electrical and mechanical engineering.

Tour also has announced that Harold F. Stose, chemical engineer, has joined the firm as head of the chemical-engineering department. Stose has more than 20 years' experience in chemical research, product development, and management of laboratory activities.

CALENDAR OF EVENTS

April

Texas Independent Producers and Royalty Owners Association, Houston, April 1.

American Petroleum Institute, division of refining, mid-year meeting, Shamrock Hotel, Houston, April 4-7.

American Society of Lubrication Engineers, annual meeting, Pennsylvania Hotel, New York, April 11-13.

National Association of Corrosion Engineers, annual convention, Netherlands Plaza Hotel, Cincinnati, Ohio, April 11-14.

Southwestern Gas Measurement Short Course, University of Oklahoma, College of Engineering, Norman, Okla., April 12-14.

National Petroleum Association, Hotel Cleveland, Cleveland, Ohio, April 13-15.

Mid-Continent Oil and Gas Association, annual federal tax forum, Roosevelt Hotel, New Orleans, April 18-19.

Midwest Power Conference, annual meeting, Hotel Sherman, Chicago, April 18-20.

Natural Gasoline Association of America, annual meeting, Texas Hotel, Fort Worth, April 20-22.

Southern Gas Association, annual convention, Buena Vista Hotel, Biloxi, Miss., April 20-22.

American Geophysical Union, annual meeting, National Museum, Washington, April 20-22.

American Geophysical Union, regional meeting, Denver, April 26-27.

Petroleum Industry Electrical Association, Petroleum Electrical Supply Association, annual convention, Mayo Hotel, Tulsa, April 26-28.

American Petroleum Institute, eastern district, William Penn Hotel, Pittsburgh, Pa., April 27-29.

Society of Automotive Engineers, Engineering Societies Building, New York, April 28.

May

American Society of Mechanical Engineers, spring meeting, Mohican Hotel, New London, Conn., May 2-4.

Independent Petroleum Association of America, midyear meeting, Roosevelt Hotel, New Orleans, La., May 3-4.

American Petroleum Institute, division of marketing, midyear meeting, Jefferson Hotel, St. Louis, May 9-10.

American Gas Association, natural-gas department, spring meeting, French Lick Springs Hotel, French Lick, Ind., May 9-10.

Interstate Oil Compact Commission, spring quarterly meeting, Roosevelt Hotel, Jacksonville, Fla., May 9-11.

American Institute of Chemical Engineers, regional meeting, Mayo Hotel, Tulsa, May 9-11.

Liquefied-Petroleum Gas Association, annual convention, Palmer House, Chicago, May 9-11.

American Petroleum Institute, division of production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles, Calif., May 12-13.

Instrument Society of America, annual spring meeting, Royal York Hotel, Toronto, Canada, May 12-13.

Oil-Heat Institute of America, national oil-heat exposition and annual convention, Boston, Mass., May 16-20.

American Gas Association, production and chemical conference, Hotel New Yorker, New York, May 23-25.

American Association of Oilwell Drilling Contractors' fourth annual drilling industry safety clinic, May 24-25, Baker Hotel, Dallas.

Society of Automotive Engineers, diesel engines, Engineering Societies Building, New York, May 26.

American Petroleum Institute, Rocky Mountain district, Gladstone Hotel, Casper, Wyo., May 26-27.

Natural Gas and Petroleum Association of Canada, annual meeting, Hotel London, London, Ont., Canada, May 26-27.

Fourth Annual Short Course in Gas Technology, sponsored by Southern Gas Association, Texas A. & I. College, Kingsville, May 30-June 1.

June

Petroleum Equipment Supplier's Association, annual meeting Broadmoor Hotel, Colorado Springs, Colo., June 5-7.

National Oil Scouts and Land Men's Association, annual meeting, Shamrock Hotel, Houston, June 9-11.

Canadian Gas Association, annual convention, Bigwin Inn, Lake of Bays, Ont., Canada, June 16-20.

American Society for Testing Materials, fifty-second annual meeting, Hotel Chalfonte Haddon Hall, Atlantic City, N. J., June 17-July 1.

Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh, Pa., June 16-17.

Kentucky Oil & Gas Association, annual meeting, Hotel Lafayette, Hotel Phoenix, Lexington, Ky., June 23-24.

American Society of Mechanical Engineers, semiannual meeting, University of California Extension Building, San Francisco, June 27-30.

August

United Nations Scientific Conference on the Conservation and Utilization of Resources, U. N. Interim Headquarters, Lake Success, N. Y., August 17-September 6.

September

Instrument Society of America, annual meeting and exhibit, Municipal Auditorium, St. Louis, September 12-16.

National Petroleum Association, Hotel Traymore, Atlantic City, N. J., September 14-16.

American Gas Association, annual convention, Chicago, September 17-20.

American Institute of Chemical Engineers, Mt. Royal Hotel, Montreal, September 18-20.

American Association of Oilwell Drilling Contractors, ninth annual meeting, Baker Hotel, Dallas, September 19-21.

National Butane-Propane Association, Jefferson Hotel, St. Louis, September 19-21.

American Society of Mechanical Engineers, fall meeting, Erie, Pa., September 28-30.

October

American Society of Mechanical Engineers, petroleum division, 1949 Petroleum Mechanical Engineering Conference, Biltmore Hotel, Oklahoma City, October 2-5.

National Lubrication Grease Institute, Hotel Roosevelt, New Orleans, La., October 3-5.

Texas Mid-Continent Oil and Gas Association, annual meeting, Rice Hotel, Houston, October 13-14.

American Gas Association, annual convention, Chicago, October 17-20.

November

American Petroleum Institute, annual meeting, Stevens Hotel, Chicago, November 7-10.

American Society of Mechanical Engineers, annual meeting, Hotel Statler, New York, November 27-December 2.

December

American Institute of Chemical Engineers, annual meeting, William Penn Hotel, Pittsburgh, Pa., December 4-7.

NOMADS

Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday each month, Jonathan Club.

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House Wants U. S. Tankers To Transport More ECA Oil

WASHINGTON.—A sharp increase in the United States tanker fleet is foreseen by the House merchant marine committee in the event Congress enacts pending legislation to require that 50 per cent of all Marshall plan cargoes must be carried in American-flag vessels.

The committee has made a favorable report on the bill and sent it to the House.

Existing law requires only that 50 per cent of shipments originating in the United States be carried in United States bottoms. The proposed act would extend that requirement to all shipments, from any part of the world, not only on a commodity basis but on a country-by-country basis as well.

"Only 23 per cent of ECA petroleum cargoes has been carried by U. S. flag tankers," the committee commented in its report. "A great portion of the total tanker cargoes has been transported in the cross trades and by foreign flag tankers.

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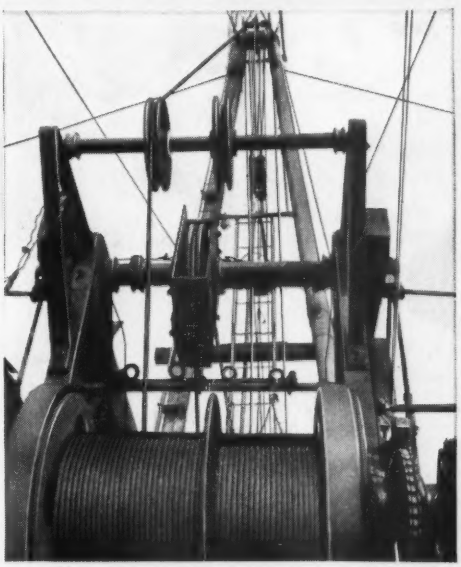
Improved Performance with LAY-SET PREFORMED

There's a wire line that resists the whipping of sucker rod and tubing lines running at high speeds. It's LAY-SET Preformed. And how it stands up under shock loads when it is stopped suddenly! Yes, LAY-SET has been the favorite for years because it offers *improved performance.*



Cable tool drilling lines are jerked, whipped and snapped. Clean-out lines run at high speeds and rub against the casing much of the way down or up. These lines must be designed for the job or they won't last long. HAZARD has cable tool lines that are engineered for longer life. They cost less to use.

On the rotary drilling rig the driller calmly throws a lever. Up shoots the string of pipe. Suddenly it stops. The whole derrick shakes. A 100-ton strain, or more, may be placed on the line. It must be good . . . and LAY-SET Preformed rotary drilling lines are good. They can take it . . . and run up greater ton-mile records.

HAZARD'S two great oil field ropes are LAY-SET Preformed and NONPARELL non-preformed. Each is designed to give improved performance on certain jobs. Each has many years of engineering and field experience built into its design. You will improve the performance of your equipment by insisting on HAZARD oil field ropes.

You're never far from a stock of LAY-SET Preformed or NONPARELL non-preformed. There are HAZARD distributors in all important oil fields. They will give you quick service and top quality lines.

ACCO

In Business for Your Safety

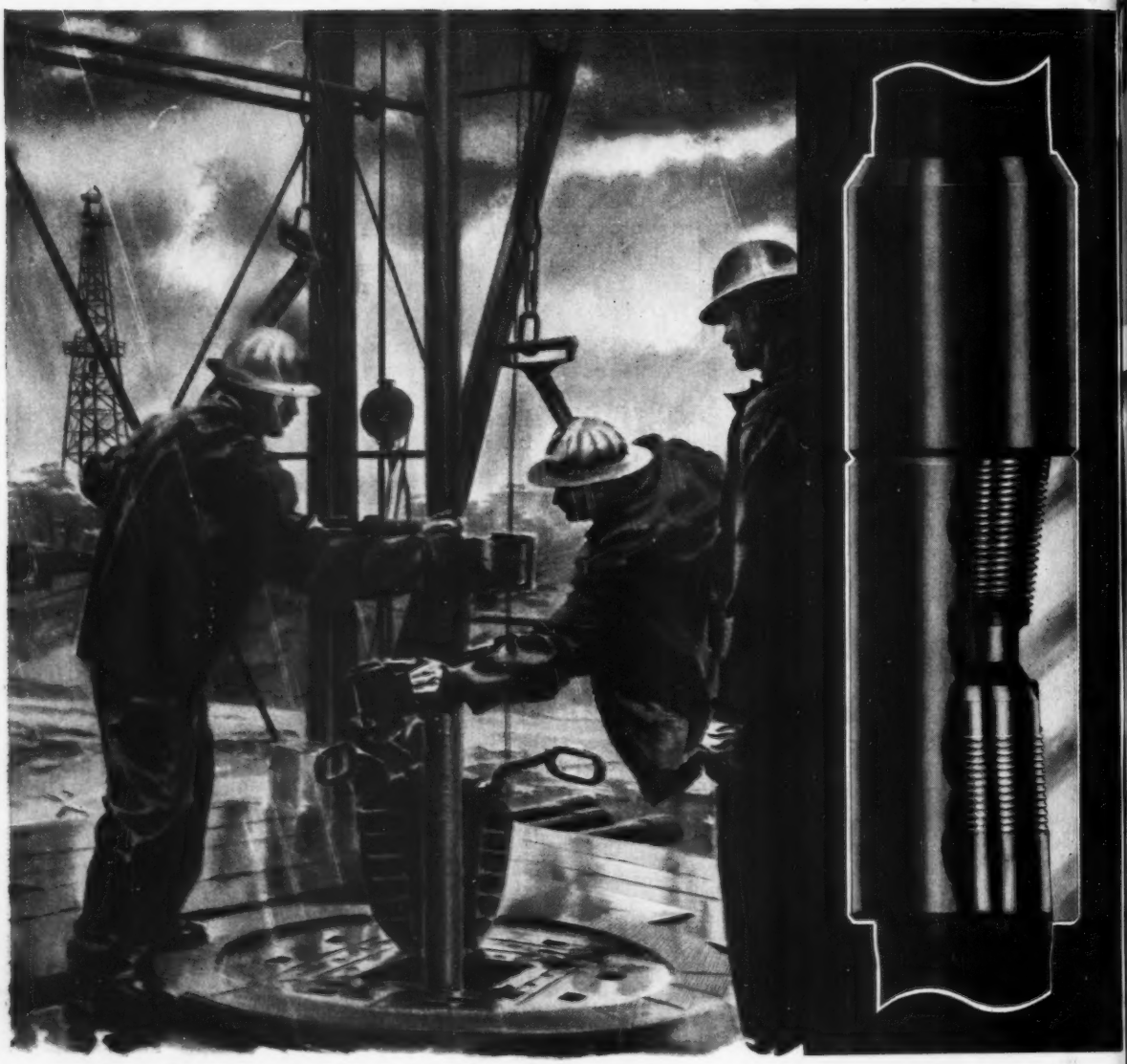
LAY-SET *Preformed* GREEN STRAND WIRE ROPE

HAZARD WIRE ROPE

A DIVISION OF AMERICAN CHAIN & CABLE

TRADE MARK

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, Pittsburgh, San Francisco, Wichita, Bridgeport, Conn.



HUGHES *SEAL GRIP* TOOL JOINTS THE BEST THREADED PIPE CONNECTION AVAILABLE

Hughes Seal Grip Tool Joints may be installed, removed, and replaced anywhere . . . designed for maximum strength, safety, with complete utility as to field replacement. Hughes Seal Grip Pipe Threads have a dependable seal at both ends, either of which, alone, is capable of preventing dangerous "wash-outs." Engaged surfaces are maintained in new condition so that joint strength is not affected by corrosive attack. This feature is particularly advantageous when joints are used on succeeding strings of pipe. The three elements of the Hughes Seal Grip Connection . . . outer seal, engaged threads, and inner seal . . . are on the same steep taper and therefore on a single cone, providing uniformity of fit on initial and replacement installations and a friction grip stronger than the torsional strength of the pipe, when properly installed. This is another example of a Hughes "Engineered Solution."

HUGHES TOOL COMPANY
HOUSTON, TEXAS

Standard of the Industry